

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of CSE/IT

Summary of Board of studies Meeting

DETAILS OF PROGRAMMES/COURSES WHERE SYLLABUS REVISION WAS CARRIED OUT

Course Name	Course Code	Year/Date of Introduction	Year/Date of Revision	Percentage of content added or replaced	Item No.	Page No.
Implementation of Provision of Proficiency in End Semester Examination & Skill Based Mini Projects in Practical in Third & Fourth Semester	1503XX 1603XX 1504XX 1603XX	2017	10/06/2021	27.5%	ITEM 7	04

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Summary of Board of Studies Meeting held on 10th June 2021

Course where Revision was carried out

Course/Subject Name	Course Code	Year/ Date of Introduction	Year /Date of revision	Percentage of content added or replaced	Item No.	Page No.
Design & Analysis of Algorithms	160312	2018	2021	8.82%	ITEM 7	04
Database Management System	160313	2018	2021	10%	ITEM 7	04

Course Focusing on Employability/Entrepreneurship/Skill Development

Course/subject name	Course Code	Activities/contents which have a bearing on increasing skill and employability	Agenda Item No.	Page No.
Scalable Data Science	160752	Memory-efficient data structures, Map-reduce and related paradigms, Linear Algebra	ITEM IT - 02	02
Social Networks	160754	Social networks available online in the form of graphs holding hidden information, surprising secrets have been time and again revealed with the help of tools like graph theory, sociology, game theory etc.	ITEM IT - 02	02
Soft Computing	900208	Various Networks for Supervised Learning and Unsupervised Learning, Genetic Algorithm, Hybrid Soft Computing Techniques	ITEM IT - 03	02
Network Security	900209	Conceptual understanding of network security principles, apply encryption techniques to secure data in transit across data networks, requirements of real-time communication security and issues related to the security of web services.	ITEM IT - 03	02

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Data Mining & Warehousing	900210	Data Warehouse and OLTP Technology, Methods for Data Pre-processing, Mining Association Rules in Large Databases, Classification & Predication and Cluster Analysis.	ITEM IT - 03	02
R Programming	900220	Programming Using R, Mathematical and Statistical Concepts, Visualization of data	ITEM IT - 03	02
Introduction to Internet of Things	IT0520H1	Communication Protocols, Integration of Sensors and Actuators with Arduino, Implementation of IoT with Raspberry Pi, Industrial IoT	ITEM IT - 04	03
Python Programming	240305	Python is a general purpose, high-level programming language; other high-level languages you might have heard of C++, PHP, and Java. Virtually all modern programming languages make use of an Integrated Development Environment (IDE), which allows the creation, editing, testing, and saving of programs and modules.	ITEM IT - 07	04
Design and Thinking Lab	230305	Students to learn basic prototyping skills needed to develop modules needed for Industry 4.0	ITEM IT - 07	04

New Courses

Course/subject name	Course Code	Activities/contents which have a bearing on increasing skill and employability	Agenda Item No.	Page No.
Data Mining & Predictive Modelling	160714	This course will provides the knowledge about various algorithms commonly used in data mining tools. The course also helps in developing various models to predict categorical and continuous outcomes.	ITEM IT - 01	01
Reinforcement Learning	160755	This course provides the basic mathematical foundations of reinforcement learning, as well as highlight some of the recent directions of research.	ITEM IT - 02	02
Computer Vision	IT0721H1	The course will have a comprehensive coverage of theory and computation related to imaging geometry, and scene understanding. It will also provide exposure to clustering, classification and deep learning techniques applied in this area.	ITEM IT - 04	03

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Introduction to Machine Learning	IT0721M1	This course will introduce some of the basic concepts of machine learning from a mathematically well-motivated perspective. Also, cover the different learning paradigms and some of the more popular algorithms and architectures used in each of these paradigms.	ITEM IT - 04	03
Novel Engaging Course	200XXX	This course will develop intellectual, mental, physical, emotional, and social abilities (Holistic Development) in a student so that he or she is capable of facing the demands and challenges of everyday life.	ITEM IT - 07	04

IT/220 dt. 13.9.21

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to R.G.P.V. Bhopal, M.P.)

D no 770

18.10.2021

BOARD OF STUDIES (BoS) PROCEEDING
IN
INFORMATION TECHNOLOGY
(Meeting Dated – 10th June, 2021)

Madhav Institute of Technology & Science, Gwalior-474 005

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Date: 10th June 2021

Minutes of Meeting of Board of Studies (BoS) in Information Technology

The Meeting of **Board of Studies (BoS) in Information Technology** was held on 10th June, 2021 at 11:00 A.M. onwards **through video conferencing**. During the meeting following were present.

1.	Dr. Akhilesh Tiwari, Professor & Head	Chairman
2.	Dr. Deepak Garg, Professor & Head, Department of Computer Science Engineering Bennett University, Greater Noida, Uttar Pradesh	External Member (Academics)
3.	Dr. Ritu Tiwari, Professor, Indian Institute of Information Technology (IIIT), Pune	External Member (Academics)
4.	Dr. Dinesh Kumar Vishwakarma, Professor, Department of Information Technology, Delhi Technological University (DTU), Delhi	External Member (Academics)
5.	Dr. Vivek Tiwari, Assistant Professor, Department of Computer Science Engineering, International Institute of Information Technology, Naya Raipur (IIIT-NR)	External Member (Academics)
6.	Mr. Abhinav Mishra, Sr. Director, Persistent System Limited	External Member (Industry)
7.	Dr. Nisha Chaurasia, Assistant Professor, Department of Information Technology, Dr. B.R. Ambedkar National Institute of Technology, Jalandhar (Punjab)	External Member (Alumnus)
8.	Dr. Sanjiv Sharma, Assistant Professor	Member
9.	Mr. Punit Kumar Johari, Assistant Professor	Member
10.	Mr. Vikas Sejwar, Assistant Professor	Member
11.	Mr. Abhilash Sonker, Assistant Professor	Member
12.	Mr. Rajeev Kumar Singh, Assistant Professor	Member
13.	Dr. Saumil Maheshwari, Assistant Professor	Member

In addition to above, faculty members engaged under TEQIP-III Project and contract faculty were also present.

The following internal member could not attend the meeting.

1.	Ms. Neha Bhardwaj, Assistant Professor	Member
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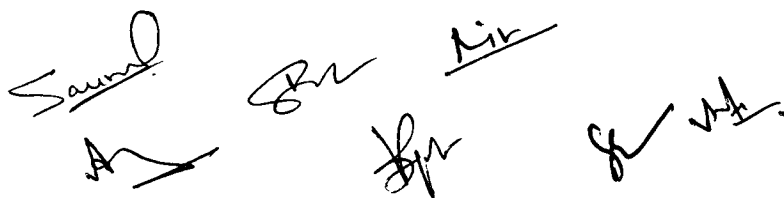
The following deliberation took place in the meeting:

The minutes of previous Board of Studies (BoS) meeting held on 28th November, 2020 were confirmed, followed by item-wise discussion (as per the agenda of present BoS meeting), as follows

ITEM IT-1:	To propose the list and syllabi for all <i>Departmental Elective (DE)</i> Courses of <i>VII Semester</i> under the flexible curriculum along with their COs (Batch admitted in 2018-19)
	The courses to be offered under Departmental Elective (DE-3) category (in offline

Handwritten signatures of the members present at the meeting.

	<p>mode) for B.Tech VII Semester, IT discipline (under flexible curriculum) were discussed and finalized, as per the following detail. The detailed syllabi (along with their COs) is Annexed as Annexure-I.</p> <table border="1" data-bbox="613 259 1298 412"> <tr> <th data-bbox="613 259 1298 293">DE-3 (B.Tech IT):</th> </tr> <tr> <td data-bbox="613 293 1298 412"> <ul style="list-style-type: none"> • Data Mining & Predictive Modelling • Soft Computing • Mobile Computing </td> </tr> </table>	DE-3 (B.Tech IT):	<ul style="list-style-type: none"> • Data Mining & Predictive Modelling • Soft Computing • Mobile Computing 		
DE-3 (B.Tech IT):					
<ul style="list-style-type: none"> • Data Mining & Predictive Modelling • Soft Computing • Mobile Computing 					
<p>ITEM IT-2:</p>	<p>To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform, to be offered in <i>online mode under Departmental Elective (DE) category</i>, with credit transfer in the VII Semester (Batch admitted in 2018-19)</p> <p>The list of Departmental Elective (DE-4) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform (in online mode) for B.Tech VII Semester IT discipline (under flexible curriculum) were discussed and finalized, as per the following detail</p> <table border="1" data-bbox="609 723 1306 898"> <tr> <th data-bbox="609 723 1306 768">DE-4 (B.Tech IT):</th> </tr> <tr> <td data-bbox="609 768 1306 898"> <ul style="list-style-type: none"> • Social Networks • Scalable Data Science • Reinforcement Learning </td> </tr> </table> <p><i>In continuation, it is also discussed and recommended that the above mentioned list of Departmental Elective (DE) course may be kept dynamic and newly emerging courses may be inducted in line with the industrial need and emerging developments (as and when desired).</i></p>	DE-4 (B.Tech IT):	<ul style="list-style-type: none"> • Social Networks • Scalable Data Science • Reinforcement Learning 		
DE-4 (B.Tech IT):					
<ul style="list-style-type: none"> • Social Networks • Scalable Data Science • Reinforcement Learning 					
<p>ITEM IT-3:</p>	<p>To propose the list and syllabi for all <i>Open Category(OC) Courses</i> of VII Semester under the flexible curriculum along with their COs (Batch admitted in 2018-19)</p> <p>The courses to be offered under Open Category (OC) Courses for B.Tech VII Semester (for the students of other departments) under flexible curriculum, were discussed and finalized, as per the following detail</p> <table border="1" data-bbox="578 1332 1337 1460"> <tr> <th data-bbox="578 1332 958 1377">OC-2:</th> <th data-bbox="958 1332 1337 1377">OC-3:</th> </tr> <tr> <td data-bbox="578 1377 958 1460"> <ul style="list-style-type: none"> • Soft Computing • Network Security </td> <td data-bbox="958 1377 1337 1460"> <ul style="list-style-type: none"> • R Programming • Computer Networks </td> </tr> </table> <p><i>It is further discussed that the Open Category (OC) courses are meant only for the students of other departments; therefore the above list of courses may be kept dynamic (as per the need and demand from other departments). The detailed syllabi (along with their COs) is Annexed as Annexure-II.</i></p>	OC-2:	OC-3:	<ul style="list-style-type: none"> • Soft Computing • Network Security 	<ul style="list-style-type: none"> • R Programming • Computer Networks
OC-2:	OC-3:				
<ul style="list-style-type: none"> • Soft Computing • Network Security 	<ul style="list-style-type: none"> • R Programming • Computer Networks 				
<p>ITEM IT-4:</p>	<p>To propose the list of "Additional Courses" which can be opted for getting an</p> <p>(i) Honours (for students of the host department)</p> <p>(ii) Minor Specialization (for students of other departments)</p> <p>[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the V semester (for the batch admitted in 2019-20) and for VII semester students (for the batch admitted in 2018-19)]</p>				



The courses available on SWAYAM/NPTEL/MOOC based learning platforms for Honours and Minor Specialization were discussed and identified. The same has been listed, as mentioned below

B.Tech V Semester (2019-20 admitted batch)
Additional Courses for "Honours" (Parent Department)
<ul style="list-style-type: none"> • Introduction to internet of things • Data Science for Engineers • The Joy of Computing using Python
Additional Courses for "Minor Specialization" (Other Departments)
<ul style="list-style-type: none"> • Data Base Management System • Object Oriented Analysis and Design • Operating System Fundamentals <p>Provision of Domain Specific Courses for minor specialization (as available on the SWAYAM/NPTEL platform), as follows:</p> <p>Domain 1: Programming</p> <ul style="list-style-type: none"> • Programming, Data Structures and Algorithms using Python • Programming in Java <p>Domain 2: Systems</p> <ul style="list-style-type: none"> • Operating System Fundamentals • Introduction to Internet of Things <p><i>In continuation, it is discussed that the department can decide regarding the course offering from the above concluded courses (either from domain specific courses or generalized list) under the minor specialization for the B.Tech V Semester (for 2019-20 admitted batch)</i></p>

B.Tech VII Semester (2018-19 admitted batch)
Additional Courses for "Honours" (Parent Department)
<ul style="list-style-type: none"> • Computer Vision • Big Data Computing • Distributed Systems
Additional Courses for "Minor Specialization" (Other Departments)
<ul style="list-style-type: none"> • Introduction to Machine Learning • Cloud computing • Big Data Computing

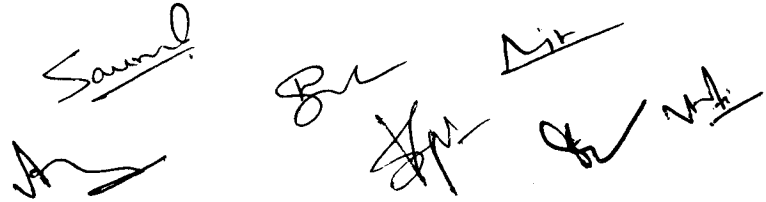
ITEM IT-5:

To review and update the syllabi for all *Departmental Core (DC) Courses of V Semester (for batches admitted in 2019-20)* under the flexible curriculum along with their COs

The Syllabi of all Departmental Core (DC) Courses which are to be offered during V Semester (B.Tech IT Programme) along with their COs under flexible curriculum were discussed, finalized and recommended. The same is annexed as Annexure-III.

Handwritten signatures of board members, including names like Saund, An, and others.

<p>ITEM IT-6:</p>	<p>To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC based Platforms for <i>Seminar / Self Study Courses</i> in B. Tech. III Semester (Batch admitted in 2020-21) & B. Tech. V Semester (Batch admitted in 2019-20)</p> <p>The courses to be offered under Seminar / Self Study through SWAYAM / NPTEL based learning platform for B. Tech. III semester (2020-21 admitted batch) (IT / IoT/ AIR) and B. Tech. V Semester (2019-20 admitted batch) (IT), under flexible curriculum were discussed and finalized, as per the following</p> <table border="1" data-bbox="454 504 1450 705"> <thead> <tr> <th data-bbox="454 504 995 548">B. Tech. III Semester</th> <th data-bbox="995 504 1450 548">B. Tech. V Semester</th> </tr> </thead> <tbody> <tr> <td data-bbox="454 548 995 705"> <ul style="list-style-type: none"> • Programming, Data Structures and Algorithms Using Python • Introduction to Quantum Computing; Quantum Algorithms and Qiskit </td> <td data-bbox="995 548 1450 705"> <ul style="list-style-type: none"> • Python for Data Science • Demystifying networking </td> </tr> </tbody> </table> <p><i>To promote the self learning, it is mandatory to register for one online course (as per above list) from the SWAYAM / NPTEL platform under the Seminar / Self Study Courses. Further, the evaluation will be based on attendance, assignments and presentations, etc.</i></p>	B. Tech. III Semester	B. Tech. V Semester	<ul style="list-style-type: none"> • Programming, Data Structures and Algorithms Using Python • Introduction to Quantum Computing; Quantum Algorithms and Qiskit 	<ul style="list-style-type: none"> • Python for Data Science • Demystifying networking
B. Tech. III Semester	B. Tech. V Semester				
<ul style="list-style-type: none"> • Programming, Data Structures and Algorithms Using Python • Introduction to Quantum Computing; Quantum Algorithms and Qiskit 	<ul style="list-style-type: none"> • Python for Data Science • Demystifying networking 				
<p>ITEM IT-7:</p>	<p>To prepare and recommend the <i>Scheme & Syllabi (along with the Course Outcomes)</i> of III & IV semester of the newly started B. Tech. Programme(s) in the emerging areas [Internet of Things (IoT) and Information Technology (AI & Robotics)] (started from 2020-21 Session)</p> <p><i>The Scheme & Syllabi (along with the Course Outcomes) of B. Tech. III & IV semester [Internet of Things (IoT)] (batch admitted 2020-21 onwards), were discussed and finalized. (annexed as Annexure- IV)</i></p> <p><i>The Scheme & Syllabi (along with the Course Outcomes) of B. Tech. III & IV semester [Information Technology (AI & Robotics)] (batch admitted 2020-21 onwards), were discussed and finalized. (annexed as Annexure- V)</i></p> <p>The Scheme & Syllabi of B. Tech Information Technology (III & IV Semester) (batch admitted 2020-21 onwards) were discussed and finalized. (annexed as Annexure- VI)</p> <p>To promote accessibility and flexibility, the scheme structure was finalized and recommended as per the newly adopted structure, which mentions the “provision for different modes of teaching” such as offline (face to face/in class), online & blended; as per the nature of the course (as also recommended by UGC). Moreover, to promote the creativity and innovation; the concept of skill through the provisioning of “Skill Based Mini Project” and to promote the Holistic Education and Informal Learning, the provision of “Novel Engaging Course”, as recommended by the National Education Policy (NEP) 2020, were also included in the scheme structure (for the batch 2020-21 onwards).</p> <p>The recommended scheme structure also contains the detail pertaining to the</p>				



Handwritten signatures of board members, including names like Samuel, An, and others.

	<p>“mode of examination” for each course (under the Multiple Mode Logical Pattern Examination System).</p> <p>In continuation, the scheme structure of B. Tech. I & II Semester (IT, IT-IoT and IT-AIR) for the Batch 2020-21, as per the newly adopted provisions/structure was presented and discussed with the consent of the house for further ratification in the coming Academic Council. (annexed as Annexure- VII)</p> <p>Further, the scheme structure of B. Tech. I & II Semester (IT, IT-IoT and IT-AIR) (for the batch 2021-22 Session onwards) was also discussed and finalized. The course and syllabi will remain same, as for the batch 2020-21. (annexed as Annexure- VIII)</p>
ITEM IT-8:	<p>To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in B. Tech. V and B. Tech. VII semester (Batches admitted in 2018-19 & 2019-2020)</p> <p>The experiment list / lab manual for the Laboratory Courses for V Semester and VII semester were discussed and finalized. The same is annexed as Annexure-IX.</p>
ITEM IT-9:	<p>To propose a suggestive list of projects which can be assigned under the ‘Skill based mini-project’ category in various laboratory courses to be offered in July-December 2021 Semester</p> <p>The list of “skill based mini project” for the Laboratory Courses of B. Tech. III & IV Semester (for 2020-21 admitted batch) was discussed and finalized. It is also discussed that the list must be treated as dynamic and more projects can be added by the course faculty. The same is annexed as Annexure-X.</p>
ITEM IT-10:	<p>To review the CO attainments for July-December 2020 semester and December - April 2021 Semester, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels</p> <p>The attainment levels of Course Outcomes (COs) for all the courses pertaining to July-Dec. 2020 semester and December - April 2021 Semester were presented and reviewed. The house appreciated the same and observed the achievement of target attainment levels for almost all the courses. The same is enclosed as Annexure-XI.</p>
ITEM IT-11:	<p>To review the curricula feedback from various stakeholders, its analysis and impact</p> <p>The summarized report of curricula feedback from various stakeholders (students, faculty members and alumni etc.) (for the July-Dec. 2020 semester and December 2020 - April 2021 semester) was presented and discussed. This was based on various considered parameters. The house was of opinion that that this practice will certainly work as a basis for further improvement of curriculum. The same is annexed as Annexure-XII.</p>
ITEM IT-12:	<p>To review Course Outcomes (COs) feedback of various courses, its analysis and impact</p> <p>The detailed analysis and impact report of Course Outcomes (COs) feedback of various courses from students (for the July - Dec. 2020 semester and Dec. 2020 - April 2021 semester) was presented and discussed. The same is enclosed as Annexure -XIII.</p>

Handwritten signatures of board members, including names like Sand, An, and others.

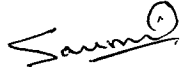
ITEM IT-13:	<p>To present matters (if any) related to new curriculum/structure of PG Programme (Batch admitted in 2020-21) needing ratification in the forthcoming Academic Council meeting</p> <p><u>Regarding the syllabus of Open Category course for M. Tech (IT) - II Semester</u></p> <p>Due to COVID 19 pandemic, the academic session 2020-21 was delayed, which resulted in a situation where the course “Introduction to Internet of Things” under the Open Category (OC) [for the M. Tech (IT) - II Semester], needs to be offered during the April 2021 to July 2021 Semester. Considering the emergent need, the course syllabus was prepared and offered. The syllabus was reviewed and recommended (in its present form) by the house for further ratification in the forthcoming Academic Council meeting. Moreover, the</p> <p>The same is annexed as Annexure-XIV.</p> <p><u>Regarding the finalization of list of courses to be offered under MOOC Course (through SWAYAM/NPTEL/ other MOOCs platforms) for III Sem. M.Tech. IT during July-Dec. 2021 semester</u></p> <p>It is decided to offer following courses-</p> <ul style="list-style-type: none"> - Introduction to Industry 4.0 and Industrial Internet of Things - Big Data Computing
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Suggestions by External Experts / Members:

- It was suggested to replace the course “Networking with TCP/IP” (under the Departmental Elective category), with other suitable course for the B. Tech. VII semester (2018-19 admitted batch).
- It was also suggested to include the courses, Predictive Analytics & Data Mining, Soft Computing, Wireless Networks etc. under the Departmental Elective category courses (2018-19 admitted batch).
- It was advised that the courses related to Cloud technologies or some industry oriented courses such as automation testing, agile methodology should be included under the Departmental Elective courses at appropriate level for B.Tech. Students.
- It was suggested that the list of Departmental Electives at any level for UG Engineering should include the courses, as per following categorization, so that the student can opt as per his/her interest
 - (a) Industry Oriented (b) Latest Trend (c) Research Oriented
- It was suggested that the courses must also be included from other MOOC platforms such as Coursera, Edx as a part of MOOC Electives for the purpose of credit transfer.
- It was suggested to create and offer a basket of courses as prerequisite for opting “Minor Specialization”, offered by the department of IT.
- It was also suggested to include Laboratory component (if necessary, as per the nature of the course) for the courses under Departmental Electives/ Open Category.
- It was suggested to remove the keyword “Arduino” from the Departmental Laboratory Course “Design and Thinking Lab”, to be offered in B.Tech. III semester.
- It was advised to include the course “Machine Learning” in the IV semester of IT-AIR discipline. The house was of opinion that the “Optimization Algorithms” and “Machine Learning” courses can be merged and accordingly, the course “Machine Learning and Optimization” can be offered.

The meeting ended with the vote of thanks to all the members.

The deliberations recorded in the minutes of meeting have been circulated electronically and consented by the external experts.


(Dr. Saumil Maheshwari)


(Mr. Rajeev Kumar Singh)


(Mr. Abhilash Sonker)


(Mr. Vikas Sejwar)


(Mr. Punif Kumar Johari)


(Dr. Sanjiv Sharma)

Present online

(Dr. Nisha Chaurasia)
Assistant Professor,
Department of Information Technology,
Dr. B.R. Ambedkar National Institute of Technology,
Jalandhar (Punjab)

Present online

(Mr. Abhinav Mishra)
Sr. Director, Persistent System Limited

Present online

(Dr. Vivek Tiwari)
Assistant Professor,
Department of Computer Science Engineering,
International Institute of Information Technology,
Naya Raipur (IIIT-NR)

Present online

(Dr. Dinesh Kumar Vishwakarma)
Professor, Delhi Technological University,
Delhi

Present online

(Dr. Ritu Tiwari)
Professor,
Indian Institute of Information Technology (IIIT),
Pune

Present online

(Dr. Deepak Garg)
Professor & Head
Department of CSE
Bennett University, Greater Noida, Uttar Pradesh

MAI
10.06.2021

(Dr. Akhilesh Tiwari)
Professor & Head,
Department of IT,
MITS Gwalior
[Chairman, BoS]

MAI
27/7/2021

DEAN (ACADEMICS)
M.I.T.S
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

Scheme of Examination

B. Tech. VII Semester (Information Technology) *(for batch admitted in Academic Session 2018-19)*

S. No.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOCs			L	T	P	
				End Sem.	Mid Sem. Exam	Quiz/Assignment	End Sem.	Lab Work & Sessional	Assignment	Exam					
1.	DE	DE	Departmental Elective (DE-3)	70	20	10	-	-	-	-	100	3	-	-	3
2.	DE	DE	Departmental Elective* (DE-4)	-	-	-	-	-	25	75	100	3	-	-	3
3.	OC	OC	Open Category (OC-2)	70	20	10	-	-	-	-	100	2	1	-	3
4.	OC	OC	Open Category (OC-3)	70	20	10	-	-	-	-	100	3	-	-	3
5.	100008	MC	Intellectual Property Rights (IPR) (MC)	70	20	10	-	-	-	-	100	2	-	-	2
6.	160701	DLC	Departmental Lab (DLC-6)	-	-	-	50	50	-	-	100	-	-	2	1
7.	160702	DLC	Summer Internship Project-III (04 weeks) (Evaluation) (DLC-7)	-	-	-	50	50	-	-	100	-	-	4	2
8.	160703	DLC	Creative Problem Solving (Evaluation) (DLC-8)	-	-	-	25	25	-	-	50	-	-	2	1
Total				280	80	40	125	125	25	75	750	13	1	8	18
Additional Courses for obtaining Honours or minor Specialization by desirous students				Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization											

DE -3 (Through Traditional Mode)		
S. No.	Subject Code	Subject Name
1.	160714	Data Mining & Predictive Modelling
2.	160715	Soft Computing
3.	160716	Mobile Computing

DE -4*		
S. No.	Subject Code	Subject Name
1.	160752	Scalable Data Science
2.	160754	Social Networks
3.	160755	Reinforcement Learning

OC-2		
S. No.	Subject Code	Subject Name
1.	900208	Soft Computing
2.	900209	Network Security

OC-3		
S. No.	Subject Code	Subject Name
1.	900220	R Programming
2.	900222	Computer Networks

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

MA



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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - I

List & Syllabi
of
Departmental Elective (DE) Courses
B.Tech VII Semester
(Batch Admitted in 2018-19)
(Information Technology)
Under Flexible Curriculum

[ITEM-1]



MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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DEPARTMENT OF INFORMATION TECHNOLOGY

**Departmental Elective (DE) to be offered in
traditional mode (offline)**

DE-3 (B.Tech IT):

- Data Mining & Predictive Modelling
- Soft Computing
- Mobile Computing

MA



DATA MINING & PREDICTIVE MODELLING
160714 (DE-3)

COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems.
 - To gain understanding of algorithms commonly used in data mining tools.
 - To learn, how to develop models to predict categorical and continuous outcomes, using various models.
-

Unit - I

Introduction: Data Mining Process, KDD Process Model, Functions of Data Mining, Applications of Data Mining. Data Warehouse and its Architecture.

Data Preparation: Data Exploration, Data Quality, Missing Values, Data Types and Conversion, Transformation, Outliers, Feature Selection, Data Sampling.

Unit - II

Association Rules: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, FP-Growth Algorithm, Partitioning Algorithms.

Unit - III

Regression & Classification: Overview of supervised learning, Linear regression models, Multiple Regression, Subset Selection, Linear Discriminant Analysis, Logistic Regression.

Introduction to Classification, Decision Trees, Rule Induction, K-Nearest Neighbors, Naïve Bayesian, Artificial Neural Networks, Support Vector Machines.

Unit – IV

Unsupervised Learning: Clustering, Major Clustering Methods: Partitioning Algorithms- K-Means, Hierarchical Algorithms, real life example of clustering.

Unit - V

Model Assessment and Selection: Ensemble Methods, Bagging and Boosting, Cross-Validation and Resampling, Measuring Classifier Performance, Assessing a Classification Algorithm's Performance (ROC Curve), Comparing Two Classification Algorithms.

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RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
 - Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.
 - Applied Predictive Analytics Principles and Techniques for the Professional Data Analyst, Wiley Publications 2014.
 - An Introduction to Statistical Learning with Applications in R, Gareth James, Daniela Witten et. al., Springer, 2015.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. identify the key processes of data mining.
 - CO2. understand the basic principles and algorithms used in practical data mining.
 - CO3. compare the underlying predictive modeling techniques.
 - CO4. select appropriate predictive modelling approaches to identify cases to progress with.
 - CO5. develop different supervised and unsupervised learning.
-

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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFT COMPUTING
160715 (DE-3)

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
 - To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
 - To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.
-

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopfield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization. Counter propagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lambda-Cuts for Fuzzy sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
 - Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
 - Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
 - Neural Networks and Learning Machines-Simon Haykin PHI.
 - Fuzzy Logic and Engineering Application, Tomthy Ross, TMH
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define basic concepts of neural network and fuzzy systems.
 - CO2. compare solutions by applying various soft computing approaches on a given problem.
 - CO3. develop and train different supervised and unsupervised learning.
 - CO4. classify various nature inspired algorithms according to their application aspect.
 - CO5. compare the efficiency of various hybrid systems.
 - CO6. design a soft computing model for solving real world problems.
-

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DEPARTMENT OF INFORMATION TECHNOLOGY

MOBILE COMPUTING
160716 (DE-3)

COURSE OBJECTIVES

- To introduce the basic concepts and principles in mobile computing.
- To provide a computer systems perspective on the converging areas of wireless networking, mobile devices, and network protocols.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.

Unit-I

Review of Personal Communication Services (PCS): Basic Concepts of Cellular Systems, Global System for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques.

Unit-II

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 Standard. Mobile IP.

Unit-III

Wireless Application Protocol (WAP): Mobile Internet Standard. WAP Gateway and Protocols, Wireless Markup Languages (WML).

Unit-IV

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of Services in 3G.

Unit-V

Wireless Local Loop (WLL): Introduction to WLL Architecture, WLL Technologies. Global Mobile Satellite Systems: Case Studies of IRIDIUM and GLOBALSTAR Systems. Bluetooth Technology, Wi-Fi and Wi-Max.

RECOMMENDED BOOKS

- Mobile communications, J. Schiller, Pearson Education.
- Wireless and Mobile Networks Architecture, by Yi —Bing Lin, John Wiley & Sons.
- Mobile & Personnel Communication Systems and Services, Raj Pandya, Prentice Hall India.

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DEPARTMENT OF INFORMATION TECHNOLOGY

- Wireless Communication- Principles and Practices, Theodore S. Rappaport, Pearson Education.
- The Wireless Application Protocol, Singhal & Bridgman, Pearson Education.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the basic concepts of mobile telecommunications system.
 - CO2. demonstrate the infrastructure to develop mobile communications system.
 - CO3. classify the different generations and technology for mobile communications.
 - CO4. examine the working of different protocols of wireless mobile communication technology.
 - CO5. determine the importance of each technology suitable for different situation of mobile and wireless communications.
 - CO6. develop protocols for adhoc and infrastructure based wireless networks.
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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE-II

***List & Syllabi
of
Open Category (OC) Courses
offered by Department of IT
in B.Tech VII Semester
(Batch Admitted in 2018-19)
Under Flexible Curriculum***

[ITEM-3]



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Open Category (OC-2) Courses	Open Category (OC-3) Courses
<ul style="list-style-type: none">• Soft Computing• Network Security	<ul style="list-style-type: none">• R Programming• Computer Networks

VA



SOFT COMPUTING
900208 (OC-2)

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopfield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization. Counter propagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lambda-Cuts for Fuzzy sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

MA



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Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
 - Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
 - Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
 - Neural Networks and Learning Machines-Simon Haykin PHI.
 - Fuzzy Logic and Engineering Application, Tomthy Ross, TMH
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define basic concepts of neural network and fuzzy systems.
 - CO2. compare solutions by applying various soft computing approaches on a given problem.
 - CO3. develop and train different supervised and unsupervised learning.
 - CO4. classify various nature inspired algorithms according to their application aspect.
 - CO5. compare the efficiency of various hybrid systems.
 - CO6. design a soft computing model for solving real world problems.
-

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DEPARTMENT OF INFORMATION TECHNOLOGY

NETWORK SECURITY
900209 (OC-2)

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
 - To understand how to apply encryption techniques to secure data in transit across data networks.
 - To explore the requirements of real-time communication security and issues related to the security of web services.
-

Unit-I

Security: Principles and Attacks, **Basic Number Theory:** Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). **Authentication:** Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). **IDS (Intrusion Detection System):** Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. **Firewalls:** Types, Functionality and Polices.



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Unit -V

Phishing: Attacks and Its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. **Denial of Service Attacks:** Smurf Attack, SYN Flooding, Distributed Denial of Service. **Hacker:** Hacking and Types of Hackers, Footprinting, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prorise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. define various aspects of network security.
 - CO2. illustrate fundamentals of number theory and cryptography.
 - CO3. apply security mechanisms to achieve principles of network security.
 - CO4. analyze the cause for various existing network attacks.
 - CO5. examine the vulnerabilities in applications over internet.
 - CO6. develop a secure protocol for achieving various network security services.
-

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R PROGRAMMING
900220 (OC-3)

COURSE OBJECTIVES

- To understand the critical programming language concepts.
 - To perform data analysis using R commands.
 - To make use of R loop functions and debugging tools.
-

Unit-I

Introduction to R: R Commands, Objects, Functions, Simple Manipulations, Matrices and Arrays, Factors, Lists, Data Frames.

Unit-II

Programming Using R: Introduction, Function Creation, Scripts, Logical Operators, Conditional Statements, Loops in R, Switch Statement, Creating List and Data Frames, List and Data Frame Operations, Recursive List.

Unit-III

Object- Oriented Programming in R: Introduction, S3 Classes, S4 Classes, References Classes, Debugging Principle in R, Import and Export Data from CSV, SAS and ODBC.

Unit-IV

Mathematical and Statistical Concepts, Hypothesis Testing, Different Statistical Distribution, Regression, Time Series Analysis.

Unit-V

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting, Packages in R for Windows, Linus and Mac.

RECOMMENDED BOOKS

- “R for Beginners”, Sandip Rakshit, Tata Mc Graw Hill Education.
 - “R programming for Data Science”, Roger D. Peng, Learn publishing.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define basic programming constructs used in R.
- CO2. explain the various commands used in R.
- CO3. apply various concept of programming for controlling the flow of data using R.



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- CO4. analyze the concept of concept of object oriented programming in R.
 - CO5. choose appropriate packages of R programming for dealing various tasks.
 - CO6. predict results from the datasets using R commands.
-

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COMPUTER NETWORKS
900222 (OC-3)

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network, Types- LAN, MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network Topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing.

Unit-III

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- The Channel Allocation Problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

Unit-IV

Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd-Warshall's Algorithm, Flooding, Congestion

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Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session & Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the fundamental concepts of computer network.
 - CO2. illustrate the basic taxonomy & terminologies of computer network.
 - CO3. Identify various parameter for affecting the performance of computer network.
 - CO4. analyze the concepts of communication using various layer of OSI model.
 - CO5. evaluate the performance of computer network in congestion and Internet.
 - CO6. design the network environment and applications for implementation of computer networking concept.
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Scheme of Examination

B.Tech. V Semester (Information Technology)

(For batches admitted in Academic Session 2019-20)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot			L	T	P	
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional					
1.	100005*	HSMC	Ethics, Economics, Entrepreneurship & Management (HSMC-4)	70	20	10	-	-	100	3	-	-	3
2.	160501	BSC	Discrete Structures (BSC- 6)	70	20	10	-	-	100	3	1	-	4
3.	160502	DC	Software Engineering (DC-9)	70	20	10	30	20	150	2	1	2	4
4.	160503	DC	Theory of Computation (DC-10)	70	20	10	30	20	150	2	1	2	4
5.	160504	DC	Microprocessor & Interfacing (DC-11)	70	20	10	30	20	150	2	1	2	4
6.	160505	DLC	Minor Project-I** (DLC-3)	-	-	-	30	20	50	-	-	2	1
7.	160506	DLC	Summer Internship Project-II (Evaluation) (DLC-4)	-	-	-	25	-	25	-	-	6	3
8.	160507	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
Total				350	100	50	145	105	750	12	4	16	24
9.	100006 ^S	MC	Indian Constitution & Traditional Knowledge (Audit Course) (MC)	70	20	10	-	-	100	3	-	-	03

Department level activity/workshop/awareness programme to be conducted; certificate of compliance to be submitted by HoD to the Exam Controller through Dean Academics

Additional Course for Honours or minor Specialization Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

* Group A/B programmes will offer this course in V/VI Semester respectively.

^S Group A/B programmes will offer this course in V/VI Semester respectively. (This is a non-credit course and it is optional to appear & pass in the end semester examination. However, a separate mark sheet will be issued to those who will qualify)

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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ANNEXURE - III

Syllabi
of
Departmental Core (DC) Courses
B.Tech V Semester
(Batches Admitted in 2019-20)
(Information Technology)
Under Flexible Curriculum
[ITEM-5]



SOFTWARE ENGINEERING
160502 (DC-9)

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
 - To understand project management and risk management associated with various types of projects.
 - To know basics of testing and understanding concept of software quality assurance and software configuration management process.
-

Unit - I

Introduction to Software Engineering: Definition, software engineering-layered Technology, Software Characteristics and Components, **Software model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection criteria of model:** Characteristics of Requirements, Status of Development Team, Users participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity, **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural design, Procedural design, data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, **Project**

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Management- Basics-People, Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1.** explain the various fundamental concepts of software engineering.
 - CO2.** develop the concepts related to software design & analysis.
 - CO3.** compare the techniques for software project management & estimation.
 - CO4.** choose the appropriate model for real life software project.
 - CO5.** design the software using modern tools and technologies.
 - CO6.** test the software through different approaches.
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THEORY OF COMPUTATION
160503 (DC-10)

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
 - To analyse and design abstract model of computation & formal languages
 - To understand and conduct mathematical proofs for computation and algorithms.
-

Unit-I

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NFA), Deterministic finite automata machines, conversion of NFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages,

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undecidable languages, Halting problem of Turing machine & the post correspondence problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
 - Element of the Theory Computation, Lewis & Christors, Pearson.
 - Theory of Computation, Chandrasekhar & Mishra, PHI.
 - Theory of Computation, Wood, Harper & Row.
 - Introduction to Computing Theory, Daniel I-A Cohen, Wiley.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1.** explain the basic concepts of switching and finite automata theory & languages.
 - CO2.** relate practical problems to languages, automata, computability and complexity.
 - CO3.** construct abstract models of computing and check their power to recognize the languages.
 - CO4.** analyse the grammar, its types, simplification and normal form.
 - CO5.** interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.
 - CO6.** develop an overview of how automata theory, languages and computation are applicable in engineering application.
-

VA



MICROPROCESSOR & INTERFACING
160504 (DC-11)

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
 - To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
 - To understand 8051 microcontroller.
-

Unit-I

Microprocessors: Introduction to x86 microprocessors, RISC and CISC processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and maximum mode signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel data transmission, Types of communication system, Baud rate RS-232C, Modem and various bus standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output configurations, Interrupts, Addressing Modes, An overview of 8051 Instruction Set.

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RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers.
 - CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.
 - CO3. demonstrate the concept of interfacing with peripheral devices.
 - CO4. make use of different interrupts and addressing modes.
 - CO5. design an interfacing for I/O devices.
 - CO6. build a system based on 8086 microprocessor and 8051 microcontroller.
-

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Department of Information Technology

Scheme of Evaluation

B. Tech. Internet of Things (IoT)

III Semester


for batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	[§] Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	250103	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	230301	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	230302	DC	Operating System	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
4.	230303	DC	Computer Networks and Protocols	50	10	20	20	-	-	-	100	3	-	-	3	Offline	PP
5.	230304	DC	Database Management System	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ
6.	230305	DLC	Design and Thinking Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
7.	230306	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	230307	DLC	Summer Internship Project-1 (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	14	2	14		-	-
10.	100002	MAC	Biology for Engineers	50	10	20	20	-	-	-	100	-	-	-	GRADE	Online	MCQ

[§] proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination							Total Credits
Theory		Lab	NEC	Theory			Lab	SIP/ SLP/ NEC	SO	SO	
Offline	Online			Blended		PP					
		Offline	Online	Offline	Interactive						
7	-	6	3	6	1	13	-	3	3	4	23
30.43%		26.09%		26.09%	4.35%	10.57%	-	13.04%	13.04%	17.39%	Credits %


 DEAN (ACADEMICS)
 M.I.T.S
 GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. Internet of Things (IoT)

IV Semester

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	230401	DC	Computer Architecture and Microprocessor	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
2.	230402	DC	Cloud Computing	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
3.	230403	DC	Software Engineering	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ
4.	230404	DC	IoT Architecture and Protocols	50	10	20	20	-	-	-	100	3	-	-	3	Offline	PP
5.	230405	DC	Network & Web Security	50	10	20	20	-	-	-	100	3	-	-	3	Offline	PP
6.	230406	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Blended (2/1)	SO
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
Total				250	50	100	100	230	60	60	850	14	02	08		-	-
8.	100006	MAC	Indian Constitution and Traditional Knowledge	50	10	20	20	-	-	-	100	-	-	-	GRADE	Online	MCQ

Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester

⁵ proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination							Credits %
Theory		Lab	NEC	Theory			Lab	NEC			
Offline	Online			Blended		PP			A+O	MCQ	
		Offline	Online	Offline	Interactive				SO	SO	
09	-	04	03	03	01	12	-	03	04	01	
45%		20%		15%	5%	60%	-	15%	20%	5%	

V.M.

Department of Information Technology

DESIGN & ANALYSIS OF ALGORITHMS
230301

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and additional real world problems on divide and conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prim's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's single source shortest path algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix chain multiplication

MA

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Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its Examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
 - Introduction to Algorithms, Cormen Thomas, Leiserson CE, Rivest RL, PHI.
 - Design & Analysis of Computer Algorithms, Ullmann, Pearson.
 - Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate a familiarity with major algorithms and data structures.
 - CO2. apply important algorithmic design paradigms and methods of analysis.
 - CO3. analyze the asymptotic performance of algorithms.
 - CO4. compare different design techniques to develop algorithms for computational problems.
 - CO5. design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.
 - CO6. understand the hardness and different classes of hardness. Further, design approximate solutions for computationally hard problems.
-

Wd

Department of Information Technology

OPERATING SYSTEM
230302

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
 - To compare several different approaches to memory management, file management and process management.
 - To understand various problems related to concurrent operations and their solutions.
-

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

Department of Information Technology

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
 - Operating Systems, internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
 - Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.
-

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

- CO1. tell the basic concept of operating systems.
 - CO2. explain the working procedure of the operating system.
 - CO3. analyze the various operating system problems and issues.
 - CO4. develop the solutions for various operating system problems and issues.
 - CO5. measure the performance of various scheduling and allocation techniques.
 - CO6. test the working of various scheduling and allocation techniques.
-

V.A.

Department of Information Technology

COMPUTER NETWORKS AND PROTOCOLS
230303

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking & Protocols.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network Types, OSI Reference Model & TCP/IP Reference Mode, Circuit Switching, Message Switching & Packet Switching, Frequency Division Multiplexing, Wavelength Division Multiplexing & Time Division Multiplexing, ISDN, SONET.

Physical Layer : Data Transmission Modes, Network topologies, Line Coding, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Networking Devices, Performance Criteria.

Unit-II

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5, HDLC.

Unit-III

Network Layer Protocols: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Routing Protocols, Flooding, Connection Oriented & Connectionless Service, IP Addressing, IPV4, IPV6, Internet Protocol Datagram, Fragmentation, ICMP, IGMP.

MAF

Department of Information Technology

Unit-IV

Transport Layer Protocols: Datagram Protocol (UDP) - Process To Process Communication, Port Number, Socket Address, User Datagram, UDP Operation. TCP Services, Process To Process Communication, Stream Delivery Service, Full Duplex Communication, Connection Oriented Service, Reliable Service, TCP Features- Numbering System, Flow Control, Error Control, Congestion Control , TCP Segment, Flow Control-Sliding Window Protocol, Silly Window Syndrome Error Control- Checksum, Acknowledgement, Retransmission, Congestion Control.

Unit-V

Application Layer Protocols: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail. Domain Name System (DNS), Telnet, FTP, TFTP, Email Protocol: SMTP, POP, IMAP.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
 - Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
 - Computer Networks and Internets, Douglas E. Comer, Pearson India.
 - TCP/IP Protocol Suite, B. A. Fourozan, Tata McGraw Hill
 - Internetworking with TCP/IP, Douglas E. Comer, Publisher- PHI, New Delhi
 - TCP/IP Illustrated by Richard Stevens, Publisher- Addison – Wesley.
-

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

- CO1. explain the fundamental concepts of computer network.
 - CO2. illustrate the basic taxonomy & terminologies of computer network protocols.
 - CO3. develop a concept for understanding advance computer network.
 - CO4. build the skill of IP addressing and routing mechanism.
 - CO5. predict the performance of computer network in congestion and internet.
 - CO6. construct the network environment for implementation of computer networking concept.
-

MAJ

Department of Information Technology

DATABASE MANAGEMENT SYSTEM
230304

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Database Approach v/s Traditional File Approach, Advantages of Database System, Database Users and Administrator, Database System Environment, Application Architectures, Schemas, Instances, Data Independence, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Entities and Relationship Model: Entity types, Entity sets, Attributes and Keys, Relationship Types and Sets, Constraints, Design issue, E-R Diagram, Weak Entity Sets.

Unit-II

Relational Model: Structure of Relational Databases: Relation, Attribute, Domain, Tuples, Degree, Cardinality, Views, Database Relations, Properties of Relations, Attributes, Keys, Attributes of Relation, Domain Constraints, Integrity Constraints.

Relational Algebra: Concepts and Operations: Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.

Unit-III

SQL: Purpose of SQL, Data Definition Language (DDL) Statements, Data Manipulation Language (DML) Statements Update Statements & Views in SQL, Data Control Language (DCL)

Department of Information Technology

Unit-IV

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency, The Process of Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition, Desirable Properties of Decomposition: Dependency Preservation, Lossless Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Management: Transaction Concept, Transaction State, Concurrent Executions, Serializability: Conflict and View Serializability, Concurrency Control: Lock-Based Protocol, Recovery: Log-Based Recovery.

RECOMMENDED BOOKS

- Database System Concepts, Abraham Silberschatz Henry F. Korth S. Sudarshan, McGraw-Hill 6th Edition.
- Database Management System, Raghu Ramakrishnan Johannes Gehrke, McGraw Hill 3rd Edition.
- Fundamentals of Database System, Elmasri & Navathe, Addison-Wesley Publishing, 5th Edition.
- An Introduction to Database Systems, Date C. J, Addison-Wesley Publishing, 8th Edition.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate the concepts of different type of database system.
 - CO2. apply relational algebra concepts to design database system.
 - CO3. make use of queries to design and access database system.
 - CO4. analyze the evaluation of transaction processing and concurrency control.
 - CO5. determine the optimize database for real world applications.
 - CO6. design a database system for a real world application.
-

MA

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Department of Information Technology

ANNEXURE - IV

Scheme & Syllabi
(along with the Course Outcomes)
of
B. Tech. III & IV Semester
(Internet of Things (IoT))
(Offered by Department of Information Technology)
(Batch Admitted in 2020-21)
Under Flexible Curriculum
[ITEM - 7]

Department of Information Technology

DESIGN AND THINKING LAB
230305

L	T	P	Total Credits
-	-	2	1

PREREQUISITES

We assume that you are already familiar with the basics of C and C++. Knowledge in other programming language especially the OOP is an added advantage. A basic understanding of microcontrollers and electronics is also expected.

COURSE OBJECTIVE:

The students will:

- Learn the basics of electronics, including reading schematics (electronics diagrams)
- Learn how to prototype circuits with a breadboard
- Learn the Arduino programming language and IDE
- Program basic Arduino examples
- Prototype circuits and connect them to the Arduino
- Program the Arduino microcontroller to make the circuits work
- Connect the Arduino microcontroller to a serial terminal to understand communication and stand-alone use
- Explore the provided example code and online resources for extending knowledge about the capabilities of the Arduino microcontroller

Unit-I

Introduction: embedded system, Understanding Embedded System, Overview of basic electronics and Digital electronics, Microprocessor vs Microcontroller, Common features of Microcontroller, Comparison between different types of microcontrollers.

Unit-II

Arduino: introduction, Pin Configuration and Architecture, Device and Platform Features, Concept of Digital and Analog ports, Arduino Interfacing Board, Introduction to Embedded C and Arduino Platform.

Unit-III

Basic Concepts and Functions: Arduino data types, Variables and constants, Operators, Control Statements, Arrays, Functions, Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT, pinMode() Function, digitalWrite() Function, analogRead() function, Arduino Interrupts.



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Unit-IV

Arduino Time and Displays: Incorporating Arduino time, delay() function, delay Microseconds() function, millis() function, micros() function. Working with Serial Monitor, Line graph via serial monitor, interfacing 8 bit LCD to Arduino, Fixed one line static message display, Running message display using the LCD Library of Arduino.

Unit-V

Arduino Sensors and Secondary Integrations: Humidity Sensor, Temperature Sensor, Water Detector/ Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switch (Relay switches). Types of Relay, Controlling Electrical appliances with electromagnetic relays.

RECOMMENDED BOOKS:

- Arduino for Dummies, by John Nussey (2013)

References:

1. Arduino Projects for Dummies, by Brock Craft (2013)
2. Programming Arduino – Getting Started with Sketches, Simon Monk (2016)
3. Programming Arduino - Next Steps, by Simon Monk (2016)

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: define the basic concept of Embedded System.
 - CO2: describe the basic principles of Arduino programming and IDE.
 - CO3: familiarize with different types of sensors and related systems.
 - CO4: design, implement, debug and test programs/ system.
 - CO5: design and develop Smart systems applications.
 - CO6: build Arduino board using different sensors.
-

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Department of Information Technology

COMPUTER ARCHITECTURE AND MICROPROCESSOR
230401

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
 - To provide the details of input & output operations, memory management and performance measurement of the computer system.
 - To understand how computer represents and manipulate data.
 - To understand different processors and basic architecture of 8/16 bit microprocessors.
-

Unit -I

Introduction: CPU structure and functions, processor organization, ALU, data paths, internal registers, status flags; System bus structure: Data, address and control buses. Processor control, micro-operations, instruction fetch, hardwired control, micro programmed control, microinstruction sequencing and execution.

Unit- II

Instruction set principles, machine instructions, types of operations and operands, encoding an instruction set, assembly language programming, addressing modes and formats.

Unit –III

Input-Output Organization: I/O organization; I/O techniques: interrupts, polling, DMA; Synchronous vs. asynchronous I/O.

Memory Organization: Memory system, internal and external memory, memory hierarchy, cache memory and its working, virtual memory concept.

Unit –IV

Microprocessors: 8085 microprocessor architecture; Instruction set, instruction types and formats; Instruction execution, instruction cycles, different types of machine cycles and timing diagram.

16-bit microprocessors, 8086 architecture, registers, memory segmentation and addressing,

MAI

Department of Information Technology

Unit-V

Basic peripherals and interfacing: 8255, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing, 8254, 8259, 8251.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
 - Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
 - Computer Organization, Carl Hamacher, THM.
 - Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.
 - The Intel. Microprocessors, Architecture, Programming and Interfacing, B.B. Brey (PHI)
 - Microprocessor 8086: Architecture, Programming, and Interfacing, Sunil Mathur(PHI)
 - Advanced Microprocessor and Interfacing, D.V. Hall (Mc-Graw Hill)
 - Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
 - Interfacing techniques in Digital Design with emphasis on Microprocessors, R.L. Krutz (John Wiley)
-

COURSE OUTCOMES

After completion of the course, students would be able to:

- CO1. demonstrate the computer architecture and microprocessor for defining basic component and functional unit.
 - CO2. develop the fundamental concept to understand the working of computer architecture and microprocessor.
 - CO3. explain the basic concept of input output and memory organization.
 - CO4. develop the skill of writing assembly language programming.
 - CO5. build a system using peripheral devices and controllers for 8086 microprocessors.
 - CO6. apply the concept computer architecture and microprocessor in solving real world problems.
-



Department of Information Technology

CLOUD COMPUTING
230402

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To introduce the broad perceptive of cloud architecture and model.
 - To understand the concept of Virtualization.
 - To apply different cloud programming model as per need.
-

Unit-I

Cloud Architecture and Model: Technologies for Network-Based System, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics, Cloud Services, Cloud models (IaaS, PaaS, SaaS), Public vs Private Cloud, Cloud Solutions Cloud ecosystem, Service management, Computing on demand.

Unit- II

Virtualization: Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices. Virtual Clusters and Resource management, Virtualization for Data-center Automation.

Unit- III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

Unit -IV

Programming Model: Parallel and Distributed Programming Paradigms- MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Mapping Applications, Programming Support, Google App Engine, Amazon AWS, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.



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Unit -V

Security in the Cloud: Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security.

RECOMMENDED BOOKS

- Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
 - John W. Rittinghouse and James F. Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
 - Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
 - Kumar Saurabh, "Cloud Computing — insights into New-Era Infrastructure", Wiley India, 2011
 - George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
 - James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define various basic concepts related to cloud computing..
 - CO2. identify the architecture, infrastructure and delivery models of cloud computing.
 - CO3. apply suitable virtualization concept
 - CO4. choose the appropriate programming models and approach
 - CO5. analyse various security issues in cloud computing.
 - CO6. compose virtualization, security and programming module in cloud computing solutions.
-

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Department of Information Technology

SOFTWARE ENGINEERING
230403

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
 - To understand project management and risk management associated with various types of projects.
 - To know basics of testing and understanding concept of software quality assurance and software configuration management process.
-

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, **Software Model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection Criteria of Model:** Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

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Department of Information Technology

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, **Project Management-** Basics-People, Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the various fundamental concepts of software engineering.
 - CO2. develop the concepts related to software design & analysis.
 - CO3. compare the techniques for software project management & estimation.
 - CO4. choose the appropriate model for real life software project.
 - CO5. design the software using modern tools and technologies.
 - CO6. test the software through different approaches.
-

VA

Department of Information Technology

IOT ARCHITECTURE & PROTOCOLS

230404

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the IOT Architecture & Protocols.
- Provide detailed knowledge about various layers, protocols and devices that facilitate IoT service.

Unit-I

Introduction: IoT architecture outline, standards - IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics

Unit-II

IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints.

Unit-III

IoT Data Link Layer & Network Layer Protocols: PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, ZWave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4,IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.

Unit-IV

IoT Transport & Session Layer Protocols: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS), Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT.

Unit-V

IoT Service Layer Protocols & Security Protocols: Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC802.15.4 , 6LoWPAN, RPL, Application Layer: UPnP, SCADA, Authentication Protocols.

NA

Department of Information Technology

RECOMMENDED BOOKS

- Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Daniel Minoli, ISBN: 978-1-118-47347-4, Willy Publications ,2016
- From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1st Edition, Academic Press, 2015.
- Architecting the Internet of Things, Bernd Scholz-Reiter, Florian Michahelles, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016
- Sensors, Actuators and Their Interfaces, N. Ida, Scitech Publishers, 2014.
- IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, CISCO Press, 2017
- Internet of Things: Architectures, Protocols and Standards , Simone Cirani , Gianluigi Ferrari , Marco Picone , Luca Veltri, Willy Publications ,2018.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the fundamental concepts of IoT Architecture.
 - CO2. illustrate the basic taxonomy & terminologies of IoT protocols.
 - CO3. develop a concept for understanding IOT technologies.
 - CO4. build the skill for establishing communication among IoT devices.
 - CO5. analyze various IoT Application layer Protocols.
 - CO6. design IoT-based systems for real-world problems.
-

WJ

Department of Information Technology

NETWORK & WEB SECURITY
230405

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
 - To understand how to apply encryption techniques to secure data in transit across data networks.
 - To explore the requirements of real-time communication security and issues related to the security of web services.
-

Unit-I

Security: Principles and Attacks, Basic Number Theory: Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). **Authentication:** Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). **IDS (Intrusion detection system):**

Department of Information Technology

Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. Firewalls: Types, Functionality and Policies.

Unit -V

Phishing: Attacks and its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Foot Printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared And Switched Networks, Sniffing Detection & Prevention, Spoofing.


RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prorise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain cryptographic algorithms, hash algorithms and authentication mechanisms.
- CO2. illustrate fundamentals of number theory, attacks and security principles.
- CO3. apply number theory and various algorithms to achieve principles of security.
- CO4. analyze the cause for various existing network attacks and describe the working of available security controls.
- CO5. examine the vulnerabilities in IT infrastructure.
- CO6. predict the attacks and controls associated with IP, transport-level, web and e-mail security.



Department of Information Technology

PYTHON PROGRAMMING LAB

230406

L	T	P	Total Credits
-	1	2	2

COURSE OBJECTIVES

- Implement an algorithm in Python by using standard programming constructs such as, functions, modules, aggregated data (arrays, lists, etc.)
- Explain the output of a given Python program and identify and correct errors in a given Python program
- Write programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc.

Unit-I

Introduction to Python programming language Data and Expressions: Literals; Variables and Identifiers; Operators; Expressions and Data Types, Logical operator; Boolean operator; Boolean Expressions; Control Structures; Selection Control, Iterative Control. Lists & tuples: List Structures; Lists in Python, Iterating over Lists in Python.

Unit-II

Functions: Arguments in functions; Program routes; Calling Value Returning Functions; Calling Non- value Returning Functions Parameter Passing; Variable Scope; Modular design Modules; Top-Down Design Python Modules; File Handling Operation in file: Reading, Writing and appending in Text Files.

Unit-III

String Processing; Dictionaries and sets operations; Exception Handling: Exceptions Data Collections applying lists etc.

Unit-IV

Introduction to Object Oriented Programming, Class, Objects, Encapsulation, Data abstraction, Inheritance, Polymorphism.

Unit-V

Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics, Displaying Images, Generating Colors, Graphics Objects, Entry Objects, Test Case: Numpy, scipy; Test Case: panda, Matplotlib.

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RECOMMENDED BOOKS

- C. Dierbach, Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus (1st ed.), Wiley, 2015. ISBN 978-8126556014.
- Yashavant Kanetkar, Let Us Python (1st ed.), BPB Publishers, 2019. ISBN 978-9388511568

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. solve computational problem using python language
 - CO2. familiar with basics syntax and features of python programming language
 - CO3. hands on experience to online coding tools like colab.
 - CO4. design a program utilizing the features of object oriented concept.
 - CO5. utilize some of the libraries available for solving problems.
-



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Department of Information Technology

ANNEXURE - V

Scheme & Syllabi
(along with the Course Outcomes)
of
B. Tech. III & IV Semester
Information Technology (Artificial
Intelligence and Robotics)
(Batch Admitted in 2020-21)
Under Flexible Curriculum
[ITEM - 7]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

III Semester

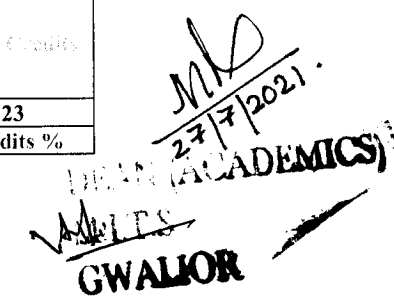
for batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	250103	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	240301	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	240302	DC	Operating System	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
4.	240303	DC	Computer Networks and Protocols	50	10	20	20	-	-	-	100	3	-	-	3	Offline	PP
5.	240304	DC	Database Management System	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ
6.	240305	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
7.	240306	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	240307	DLC	Summer Internship Project-I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	14	2	14		-	-
10.	100002	MAC	Biology for Engineers	50	10	20	20	-	-	-	100	-	-	-	GRADE	Online	MCQ

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination							Total Credits
Theory		Lab	NEC	Theory			Lab	SIP/ SLP/ NEC			
Offline	Online			Offline	Interactive	PP			A+O	MCQ	
7	-	6	3	6	1	13	-	3	3	4	23
30.43%	-	26.09%	13.04%	26.09%	4.35%	10.57%	-	13.04%	13.04%	17.39%	Credits %



 M.D.

 27/7/2021.

 HEAD (ACADEMICS)

 GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

IV Semester

for batches admitted in academic session 2020 – 21 onwards

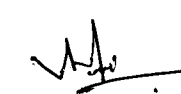
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	240401	DC	Computer Architecture and Microprocessor	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
2.	240402	DC	Cloud Computing	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
3.	240403	DC	Software Engineering	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ
4.	240404	DC	Machine Learning and Optimization	50	10	20	20	-	-	-	100	3	-	2	4	Offline	PP
5.	240405	DC	Network & Web Security	50	10	20	20	-	-	-	100	3	-	-	3	Offline	PP
6.	240406	DLC	Design and Thinking Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
Total				250	50	100	100	230	60	60	850	14	01	10		-	-
8.	100006	MAC	Indian Constitution and Traditional Knowledge	50	10	20	20	-	-	-	100	-	-	-	GRADE	Online	MCQ

Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching					Mode of Examination						Total Credits
Theory		Lab	Blended		Lab	Theory			Lab	NEC	
Offline	Online		Offline	Online		PP	A+O	MCQ			
9	-	4	2	4	1	12	-	3	4	1	
45%		20%	10%	20%	5%	60%	-	15%	20%	5%	Credits %



Department of Information Technology

DESIGN & ANALYSIS OF ALGORITHMS
240301

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and additional real world problems on divide and conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prim's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's single source shortest path algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix chain multiplication

VAI

Department of Information Technology

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its Examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
 - Introduction to Algorithms, Cormen Thomas, Leiserson CE, Rivest RL, PHI.
 - Design & Analysis of Computer Algorithms, Ullmann, Pearson.
 - Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate a familiarity with major algorithms and data structures.
 - CO2. apply important algorithmic design paradigms and methods of analysis.
 - CO3. analyze the asymptotic performance of algorithms.
 - CO4. compare different design techniques to develop algorithms for computational problems.
 - CO5. design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.
 - CO6. understand the hardness and different classes of hardness. Further, design approximate solutions for computationally hard problems.
-

VAJ

Department of Information Technology

OPERATING SYSTEM
240302

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
 - To compare several different approaches to memory management, file management and process management.
 - To understand various problems related to concurrent operations and their solutions.
-

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

M.A.

Department of Information Technology

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
 - Operating Systems, internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
 - Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.
-

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

- CO1. tell the basic concept of operating systems.
 - CO2. explain the working procedure of the operating system.
 - CO3. analyze the various operating system problems and issues.
 - CO4. develop the solutions for various operating system problems and issues.
 - CO5. measure the performance of various scheduling and allocation techniques.
 - CO6. test the working of various scheduling and allocation techniques.
-

MA

Department of Information Technology

COMPUTER NETWORKS AND PROTOCOLS
240303

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking & Protocols.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network Types, OSI Reference Model & TCP/IP Reference Mode, Circuit Switching, Message Switching & Packet Switching, Frequency Division Multiplexing, Wavelength Division Multiplexing & Time Division Multiplexing, ISDN, SONET.

Physical Layer : Data Transmission Modes, Network topologies, Line Coding, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Networking Devices, Performance Criteria.

Unit-II

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5, HDLC.

Unit-III

Network Layer Protocols: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Routing Protocols, Flooding, Connection Oriented & Connectionless Service, IP Addressing, IPV4, IPV6, Internet Protocol Datagram, Fragmentation, ICMP, IGMP.



Department of Information Technology

Unit-IV

Transport Layer Protocols: Datagram Protocol (UDP) - Process To Process Communication, Port Number, Socket Address, User Datagram, UDP Operation. TCP Services, Process To Process Communication, Stream Delivery Service, Full Duplex Communication, Connection Oriented Service, Reliable Service, TCP Features- Numbering System, Flow Control, Error Control, Congestion Control , TCP Segment, Flow Control-Sliding Window Protocol, Silly Window Syndrome Error Control-Checksum, Acknowledgement, Retransmission, Congestion Control.

Unit-V

Application Layer Protocols: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail. Domain Name System (DNS), Telnet, FTP, TFTP, Email Protocol: SMTP, POP, IMAP.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.
- TCP/IP Protocol Suite, B. A. Fourozan, Tata McGraw Hill
- Internetworking with TCP/IP, Douglas E. Comer, Publisher- PHI, New Delhi
- TCP/IP Illustrated by Richard Stevens, Publisher- Addison – Wesley.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

- CO1. explain the fundamental concepts of computer network.
 - CO2. illustrate the basic taxonomy & terminologies of computer network protocols.
 - CO3. develop a concept for understanding advance computer network.
 - CO4. build the skill of IP addressing and routing mechanism.
 - CO5. predict the performance of computer network in congestion and internet.
 - CO6. construct the network environment for implementation of computer networking concept.
-

MA

Department of Information Technology

DATABASE MANAGEMENT SYSTEM
240304

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Database Approach v/s Traditional File Approach, Advantages of Database System, Database Users and Administrator, Database System Environment, Application Architectures, Schemas, Instances, Data Independence, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Entities and Relationship Model: Entity types, Entity sets, Attributes and Keys, Relationship Types and Sets, Constraints, Design issue, E-R Diagram, Weak Entity Sets.

Unit-II

Relational Model: Structure of Relational Databases: Relation, Attribute, Domain, Tuples, Degree, Cardinality, Views, Database Relations, Properties of Relations, Attributes, Keys, Attributes of Relation, Domain Constraints, Integrity Constraints.

Relational Algebra: Concepts and Operations: Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.

Unit-III

SQL: Purpose of SQL, Data Definition Language (DDL) Statements, Data Manipulation Language (DML) Statements Update Statements & Views in SQL, Data Control Language (DCL)

M.A.

Department of Information Technology

Unit-IV

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency, The Process of Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition, Desirable Properties of Decomposition: Dependency Preservation, Lossless Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Management: Transaction Concept, Transaction State, Concurrent Executions, Serializability: Conflict and View Serializability, Concurrency Control: Lock-Based Protocol, Recovery: Log-Based Recovery.

RECOMMENDED BOOKS

- Database System Concepts, Abraham Silberschatz Henry F. Korth S. Sudarshan, McGraw-Hill 6th Edition.
- Database Management System, Raghu Ramakrishnan Johannes Gehrke, McGraw Hill 3rd Edition.
- Fundamentals of Database System, Elmasri & Navathe, Addison-Wesley Publishing, 5th Edition.
- An Introduction to Database Systems, Date C. J, Addison-Wesley Publishing, 8th Edition.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate the concepts of different type of database system.
 - CO2. apply relational algebra concepts to design database system.
 - CO3. make use of queries to design and access database system.
 - CO4. analyze the evaluation of transaction processing and concurrency control.
 - CO5. determine the optimize database for real world applications.
 - CO6. design a database system for a real world application.
-

M.A.

Department of Information Technology

PYTHON PROGRAMMING LAB

240305

L	T	P	Total Credits
-	-	2	1

COURSE OBJECTIVES

- Implement an algorithm in Python by using standard programming constructs such as, functions, modules, aggregated data (arrays, lists, etc.)
- Explain the output of a given Python program and identify and correct errors in a given Python program
- Write programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc.

Unit-I

Introduction to Python programming language Data and Expressions: Literals; Variables and Identifiers; Operators; Expressions and Data Types, Logical operator; Boolean operator; Boolean Expressions; Control Structures; Selection Control, Iterative Control. Lists & tuples: List Structures; Lists in Python, Iterating over Lists in Python.

Unit-II

Functions: Arguments in functions; Program routes; Calling Value Returning Functions; Calling Non- value Returning Functions Parameter Passing; Variable Scope; Modular design Modules; Top-Down Design Python Modules; File Handling Operation in file: Reading, Writing and appending in Text Files.

Unit-III

String Processing; Dictionaries and sets operations; Exception Handling: Exceptions Data Collections applying lists etc.

Unit-IV

Introduction to Object Oriented Programming, Class, Objects, Encapsulation, Data abstraction, Inheritance, Polymorphism.

Unit-V

Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics, Displaying Images, Generating Colors, Graphics Objects, Entry Objects, Test Case: Numpy, scipy; Test Case: panda, Matplotlib.

AA

Department of Information Technology

RECOMMENDED BOOKS

- C. Dierbach, Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus (1st ed.), Wiley, 2015. ISBN 978-8126556014.
 - Yashavant Kanetkar, Let Us Python (1st ed.), BPB Publishers, 2019. ISBN 978-9388511568
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. solve computational problem using python language
 - CO2. familiar with basics syntax and features of python programming language
 - CO3. hands on experience to online coding tools like colab.
 - CO4. design a program utilizing the features of object oriented concept.
 - CO5. utilize some of the libraries available for solving problems.
-

MA

Department of Information Technology

**COMPUTER ARCHITECTURE AND MICROPROCESSOR
240401**

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
 - To provide the details of input & output operations, memory management and performance measurement of the computer system.
 - To understand how computer represents and manipulate data.
 - To understand different processors and basic architecture of 8/16 bit microprocessors.
-

Unit -I

Introduction: CPU structure and functions, processor organization, ALU, data paths, internal registers, status flags; System bus structure: Data, address and control buses. Processor control, micro-operations, instruction fetch, hardwired control, micro programmed control, microinstruction sequencing and execution.

Unit- II

Instruction set principles, machine instructions, types of operations and operands, encoding an instruction set, assembly language programming, addressing modes and formats.

Unit –III

Input-Output Organization: I/O organization; I/O techniques: interrupts, polling, DMA; Synchronous vs. asynchronous I/O.

Memory Organization: Memory system, internal and external memory, memory hierarchy, cache memory and its working, virtual memory concept.

Unit –IV

Microprocessors: 8085 microprocessor architecture; Instruction set, instruction types and formats; Instruction execution, instruction cycles, different types of machine cycles and timing diagram.

16-bit microprocessors, 8086 architecture, registers, memory segmentation and addressing,

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Unit-V

Basic peripherals and interfacing: 8255, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing, 8254, 8259, 8251.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
 - Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
 - Computer Organization, Carl Hamacher, THM.
 - Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.
 - The Intel. Microprocessors, Architecture, Programming and Interfacing, B.B. Brey (PHI)
 - Microprocessor 8086: Architecture, Programming, and Interfacing, Sunil Mathur(PHI)
 - Advanced Microprocessor and Interfacing, D.V. Hall (Mc-Graw Hill)
 - Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
 - Interfacing techniques in Digital Design with emphasis on Microprocessors, R.L. Krutz (John Wiley)
-

COURSE OUTCOMES

After completion of the course, students would be able to:

- CO1. demonstrate the computer architecture and microprocessor for defining basic component and functional unit.
 - CO2. develop the fundamental concept to understand the working of computer architecture and microprocessor.
 - CO3. explain the basic concept of input output and memory organization.
 - CO4. develop the skill of writing assembly language programming.
 - CO5. build a system using peripheral devices and controllers for 8086 microprocessors.
 - CO6. apply the concept computer architecture and microprocessor in solving real world problems.
-

MA

Department of Information Technology

CLOUD COMPUTING
240402

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To introduce the broad perceptive of cloud architecture and model.
 - To understand the concept of Virtualization.
 - To apply different cloud programming model as per need.
-

Unit- I

Cloud Architecture and Model: Technologies for Network-Based System, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics, Cloud Services, Cloud models (IaaS, PaaS, SaaS), Public vs Private Cloud, Cloud Solutions Cloud ecosystem, Service management, Computing on demand.

Unit- II

Virtualization: Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices. Virtual Clusters and Resource management, Virtualization for Data-center Automation.

Unit- III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

Unit -IV

Programming Model: Parallel and Distributed Programming Paradigms- MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Mapping Applications, Programming Support, Google App Engine, Amazon AWS, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.



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Unit -V

Security in the Cloud: Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security.

RECOMMENDED BOOKS

- Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers,2012.
 - John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
 - Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
 - Kumar Saurabh, " Cloud Computing — insights into New-Era Infrastructure", Wiley India,2011
 - George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
 - James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define various basic concepts related to cloud computing..
 - CO2. identify the architecture, infrastructure and delivery models of cloud computing.
 - CO3. apply suitable virtualization concept
 - CO4. choose the appropriate programming models and approach
 - CO5. analyse various security issues in cloud computing.
 - CO6. compose virtualization, security and programming module in cloud computing solutions.
-

WJ

Department of Information Technology

SOFTWARE ENGINEERING
240403

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
 - To understand project management and risk management associated with various types of projects.
 - To know basics of testing and understanding concept of software quality assurance and software configuration management process.
-

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, **Software Model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection Criteria of Model:** Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

W.A.

Department of Information Technology

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, **Project Management-** Basics-People, Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the various fundamental concepts of software engineering.
 - CO2. develop the concepts related to software design & analysis.
 - CO3. compare the techniques for software project management & estimation.
 - CO4. choose the appropriate model for real life software project.
 - CO5. design the software using modern tools and technologies.
 - CO6. test the software through different approaches.
-

VA

Department of Information Technology

MACHINE LEARNING AND OPTIMIZATION
240404

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- Identify and develop operational research models from the verbal description of the real system.
 - Analyse the results to resolve resource optimization
 - To practice their skills on many well-known real-life problems.
-

Unit-I

Introduction to ML: Statistical Learning, Supervised vs Unsupervised Learning, Regression vs Classification Problems, Formulation of Design Problems as Mathematical Programming Problems, Linear Regression, Multiple Linear Regression, Logistic Regression, K-Nearest Neighbour Classification.

Unit-II

Tree Based Methods: Decision Tree Learning: Decision Tree Representation, Appropriate Problems for Decision Tree Learning, Random Forest, Issues in Decision Tree Learning. Naïve Bayes Classifier, Support Vector Machines.

Unit-III

Introduction to Optimization Algorithms: Optimization Algorithms, Engineering Applications of Optimization Algorithms, Objective Function, Optimization Algorithms for Differentiable and Non-Differentiable Objective Functions: Stationary and Critical Point, Functions of Single and Two Variables; Global Optimum, Single Variable Optimization, Two Variable Optimizations. First Order Algorithms, Local Descent Algorithms, Bracketing Algorithms. Stochastic Algorithms, Population Based Algorithms: Introduction, Genetic Algorithms.

Unit-IV

Artificial Neural Network: Neural Network Representation, Neural Networks as a Paradigm for Parallel Processing, Linear Discrimination, Pairwise Separation, Gradient Descent, Perceptron, Training A Perceptron, Multilayer Perceptron, Back Propagation Algorithm, Dynamically Modifying Network Structure.

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Unit-V

Unsupervised Learning: Clustering, Common Distance Measures, Hierarchical Algorithms – Agglomerative and Divisive, Partitioning Algorithms – K-Means and Derivatives; Design and Analysis of Machine Learning Experiments: Guidelines for Machine Learning Experiments, Factors, Response, and Strategy of Experimentation, Ensemble Methods, Bagging and Boosting, Cross-Validation and Resampling Methods, Measuring Classifier Performance, Assessing a Classification Algorithm's Performance (ROC Curve), Comparing Two Classification Algorithms, Comparing Multiple Algorithms: Analysis of Variance, Comparison over Multiple Datasets.

RECOMMENDED BOOKS

- Algorithms for optimization, Mykel and Tim, The MIT Press
 - Principles of Soft Computing, S.N. Deepa, Fundamentals of Computer Algorithms, Wiley.
 - Optimization for Engineering Design: Algorithms and Examples (2nd ed.), Kalyanmoy Deb, Prentice Hall India Learning Private Limited, 2012.
 - Introduction to Statistical Learning, Gareth James et al, Springer texts in statistics, 2015.
 - Machine Learning (1st ed.), T. M. Mitchell, McGraw Hill, 2017. ISBN 978-1259096952.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate a familiarity with major optimization algorithms.
 - CO2. apply important optimization algorithmic and analyze the results.
 - CO3. finding out the local and global optimum.
 - CO4. formulation of design problems as mathematical programming problems.
 - CO5. Design Supervised and Unsupervised Learning approaches for real-life problems.
-

MA

Department of Information Technology

NETWORK & WEB SECURITY
240405

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
 - To understand how to apply encryption techniques to secure data in transit across data networks.
 - To explore the requirements of real-time communication security and issues related to the security of web services.
-

Unit-I

Security: Principles and Attacks, Basic Number Theory: Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). **Authentication:** Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). **IDS (Intrusion detection system):**

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Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. Firewalls: Types, Functionality and Policies.

Unit -V

Phishing: Attacks and its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Foot Printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared And Switched Networks, Sniffing Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prorise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain cryptographic algorithms, hash algorithms and authentication mechanisms.
 - CO2. illustrate fundamentals of number theory, attacks and security principles.
 - CO3. apply number theory and various algorithms to achieve principles of security.
 - CO4. analyze the cause for various existing network attacks and describe the working of available security controls.
 - CO5. examine the vulnerabilities in IT infrastructure.
 - CO6. predict the attacks and controls associated with IP, transport-level, web and e-mail security.
-

WA

Department of Information Technology

DESIGN AND THINKING LAB
240406

L	T	P	Total Credits
-	-	2	1

PREREQUISITES

We assume that you are already familiar with the basics of C and C++. Knowledge in other programming language especially the OOP is an added advantage. A basic understanding of microcontrollers and electronics is also expected.

COURSE OBJECTIVE:

The students will:

- Learn the basics of electronics, including reading schematics (electronics diagrams)
- Learn how to prototype circuits with a breadboard
- Learn the Arduino programming language and IDE
- Program basic Arduino examples
- Prototype circuits and connect them to the Arduino
- Program the Arduino microcontroller to make the circuits work
- Connect the Arduino microcontroller to a serial terminal to understand communication and stand-alone use
- Explore the provided example code and online resources for extending knowledge about the capabilities of the Arduino microcontroller

Unit-I

Introduction: embedded system, Understanding Embedded System, Overview of basic electronics and Digital electronics, Microprocessor vs Microcontroller, Common features of Microcontroller, Comparison between different types of microcontrollers.

Unit-II

Arduino: introduction, Pin Configuration and Architecture, Device and Platform Features, Concept of Digital and Analog ports, Arduino Interfacing Board, Introduction to Embedded C and Arduino Platform.

Unit-III

Basic Concepts and Functions: Arduino data types, Variables and constants, Operators, Control Statements, Arrays, Functions, Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT, pinMode() Function, digitalWrite() Function, analogRead() function, Arduino Interrupts.

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Unit-IV

Arduino Time and Displays: Incorporating Arduino time, delay() function, delay Microseconds() function, millis() function, micros() function. Working with Serial Monitor, Line graph via serial monitor, interfacing 8 bit LCD to Arduino, Fixed one line static message display, Running message display using the LCD Library of Arduino.

Unit-V

Arduino Sensors and Secondary Integrations: Humidity Sensor, Temperature Sensor, Water Detector/ Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switch (Relay switches). Types of Relay, Controlling Electrical appliances with electromagnetic relays.

RECOMMENDED BOOKS:

- Arduino for Dummies, by John Nussey (2013)

References:

1. Arduino Projects for Dummies, by Brock Craft (2013)
2. Programming Arduino – Getting Started with Sketches, Simon Monk (2016)
3. Programming Arduino - Next Steps, by Simon Monk (2016)

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: define the basic concept of Embedded System.
 - CO2: describe the basic principles of Arduino programming and IDE.
 - CO3: familiarize with different types of sensors and related systems.
 - CO4: design, implement, debug and test programs/ system.
 - CO5: design and develop Smart systems applications.
 - CO6: build Arduino board using different sensors.
-



MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Information Technology

ANNEXURE - VI

Scheme & Syllabi
(along with the Course Outcomes)
of
B. Tech. III & IV Semester
(Information Technology)
(Batch Admitted in 2020-21)
Under Flexible Curriculum
[ITEM - 7]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. III Semester (Information Technology)

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	100001	BSC	Engineering Mathematics-II	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	160311	DC	Computer System Organization	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
3.	160312	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
4.	160313	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
5.	160314	DC	Operating System	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	160315	DLC	Java Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Blended (2/1)	SO
7.	160316	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	160317	DLC	Summer Internship Project-I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	12	4	14		-	-
10.	100002	MAC	Biology for Engineers	50	10	20	20	-	-	-	100	3	-	-	Grade	Online	MCQ

⁵ proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question


AO: Assignment + Oral

OB: Open Book

PP: Pen Paper

SO: Submission + Oral

Mode of Teaching					Mode of Examination					Total Credits	
Theory		Lab	NEC		Theory			Lab	NEC		
Offline	Online		Blended	Interactive	PP	A+O	MCQ		SO		SO
		Offline	Online								
03	-	08	05	06	01	12	-	03	07	01	23
					4.35%	52.17%	-	13.04%	30.43%	4.35%	Credits %


DEAN (ACADEMICS)
M.I.T.S
GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. IV Semester (Information Technology)

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	100003	BSC	Engineering Mathematics- III	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	160411	DC	Computer Graphics & Multimedia	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
3.	160412	DC	Software Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
4.	160413	DC	Computer Networks	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
5.	100004	MC	Cyber Security	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	MCQ
6.	160414	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Blended (2/1)	SO
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
Total				250	50	100	100	230	60	60	850	12	4	8	20	-	-
8.	100006	MAC	Indian Constitution and Traditional Knowledge	50	10	20	20	-	-	-	100	-	-	-	GRADE	Online	MCQ

Summer Internship Project-II (Soft skill Based) for two weeks duration: Evaluation in V Semester

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching					Mode of Examination					Total Credits	
Theory		Lab	NEC		Theory			Lab	NEC		
Offline	Online		Blended		PP	A+O	MCQ				
		Offline	Online	Offline				Interactive			SO
09	-	04	03	03	01	09	-	06	04	01	20
45%		20%	15%	15%	5%	45%	-	30%	20%	5%	Credits %

MA

Department of Information Technology

COMPUTER SYSTEM ORGANIZATION
160311

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
 - To provide the details of input & output operations, memory management and performance measurement of the computer system.
 - To understand how computer represents and manipulate data.
-

Unit -I

Introduction: Von Newman Model, Various Subsystems, CPU, Memory, I/O, System Bus, CPU and Memory Registers, Program Counter, Accumulator, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Tree-State Bus Buffers, Bus and Memory Transfers, Arithmetic Micro-Operation, Logic Micro-Operation, Shift Micro-Operation Register Transfer Micro Operations, Arithmetic Micro-Operations, Logic Micro-Operations and Shift Micro-Operations.

Unit- II

Computer Arithmetic: Addition and Subtraction with Signed-Magnitude, Multiplication Algorithm, Division Algorithm, Division Algorithms, Floating-Point Arithmetic Operations.

Central Processing Unit (CPU): General Purpose Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC), Hardwired and Microprogrammed Control.

Unit -III

Microprocessors: Introduction of 8085 Microprocessor: Architecture, Instruction Set, Addressing Modes, Interrupts and Basic Assembly Language Programming.

Unit -IV

Input-Output Organization: Peripheral Devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA (DMA Controller, DMA



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Transfer), Input-Output Processor (IOP), Data Transfer- Serial/Parallel, Simplex/ Half Duplex/ Full Duplex.

Unit-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory- Organization and Mappings, Memory Management Hardware, Introduction to Pipelining & Multiprocessors.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. recall the basic building blocks of computer Architecture.
- CO2. compare different memories.
- CO3. apply the concept of memory mapping, multiprocessor and pipelining in solving real world problems.
- CO4. analyze various modes of Input-Output data transfer.
- CO5. evaluate the arithmetic related to the number system.
- CO6. develop the skill of writing low level programming.

V.A.

Department of Information Technology

DESIGN & ANALYSIS OF ALGORITHMS
160312

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and additional real world problems on divide and conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prim's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's single source shortest path algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix chain multiplication



Department of Information Technology

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its Examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
 - Introduction to Algorithms, Cormen Thomas, Leiserson CE, Rivest RL, PHI.
 - Design & Analysis of Computer Algorithms, Ullmann, Pearson.
 - Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate a familiarity with major algorithms and data structures.
 - CO2. apply important algorithmic design paradigms and methods of analysis.
 - CO3. analyze the asymptotic performance of algorithms.
 - CO4. compare different design techniques to develop algorithms for computational problems.
 - CO5. design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.
 - CO6. understand the hardness and different classes of hardness. Further, design approximate solutions for computationally hard problems.
-



Department of Information Technology

DATABASE MANAGEMENT SYSTEM
160313

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Database Approach v/s Traditional File Approach, Advantages of Database System, Database Users and Administrator, Database System Environment, Application Architectures, Schemas, Instances, Data Independence, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Entities and Relationship Model: Entity types, Entity sets, Attributes and Keys, Relationship Types and Sets, Constraints, Design issue, E-R Diagram, Weak Entity Sets.

Unit-II

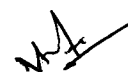
Relational Model: Structure of Relational Databases: Relation, Attribute, Domain, Tuples, Degree, Cardinality, Views, Database Relations, Properties of Relations, Attributes, Keys, Attributes of Relation, Domain Constraints, Integrity Constraints.

Relational Algebra: Concepts and Operations: Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.

Unit-III

SQL: Purpose of SQL, Data Definition Language (DDL) Statements, Data Manipulation Language (DML) Statements Update Statements & Views in SQL, Data Control Language (DCL)



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Unit-IV

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency, The Process of Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition, Desirable Properties of Decomposition: Dependency Preservation, Lossless Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Management: Transaction Concept, Transaction State, Concurrent Executions, Serializability: Conflict and View Serializability, Concurrency Control: Lock-Based Protocol, Recovery: Log-Based Recovery.

RECOMMENDED BOOKS

- Database System Concepts, Abraham Silberschatz Henry F. Korth S. Sudarshan, McGraw-Hill 6th Edition.
- Database Management System, Raghu Ramakrishnan Johannes Gehrke, McGraw Hill 3rd Edition.
- Fundamentals of Database System, Elmasri & Navathe, Addison-Wesley Publishing, 5th Edition.
- An Introduction to Database Systems, Date C. J, Addison-Wesley Publishing, 8th Edition.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate the concepts of different type of database system.
 - CO2. apply relational algebra concepts to design database system.
 - CO3. make use of queries to design and access database system.
 - CO4. analyze the evaluation of transaction processing and concurrency control.
 - CO5. determine the optimize database for real world applications.
 - CO6. design a database system for a real world application.
-

MA

Department of Information Technology

OPERATING SYSTEM
160314

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

MA

Department of Information Technology

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
 - Operating Systems, internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
 - Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.
-

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

- CO1. tell the basic concept of operating systems.
 - CO2. explain the working procedure of the operating system.
 - CO3. analyze the various operating system problems and issues.
 - CO4. develop the solutions for various operating system problems and issues.
 - CO5. measure the performance of various scheduling and allocation techniques.
 - CO6. test the working of various scheduling and allocation techniques.
-



Department of Information Technology

JAVA PROGRAMMING LAB
160315

L	T	P	Total Credits
-	1	2	2

COURSE OBJECTIVES

- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
 - To acquire the ability to write a computer program to solve specified problems.
 - To be able to use Java SDK environment to create, debug and run simple Java programs.
-

Unit-I

Introduction to Java programming: Overview and Characteristics of Java, The Java Virtual Machine, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions. Packages, Package access, Variables and data types, Conditional and looping constructs, Arrays.

Unit-II

Object-oriented programming with Java Classes and Objects: Fields and Methods, Constructors, Overloading methods, Nested classes, Overriding methods, Polymorphism, Making methods and classes final, Wrapper classes.

Unit-III

Extending Classes and Inheritance: Types of Inheritance in Java, Abstract classes and methods, Interfaces, use of 'super', Polymorphism in inheritance. Garbage collection in JAVA.

Exception handling: Try- Catch, Throw, Throws, Finally constructs, The Exception class.

Unit-IV

String Package and Multithreading: Operation on String, Mutable & Immutable String, Tokenizing a String, Creating Strings using String Buffer class.

Understanding Threads: Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities and Synchronizing Threads.



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Unit-V

The I/O Package: Input Stream and Output Stream classes, Reader and Writer classes, Basics of AWT, Swing and Applets: Layout Managers, Event Handling, Classes for various controls, such as label, choice, list, checkbox, etc., Dialogs and frames using menus.

Basic concepts of networking: Working with URLs, Concepts of URLs and Sockets. Basics of database connectivity with JDBC.

RECOMMENDED BOOKS

- Programming with JAVA: A Primer, E. Balagurusamy, Tata McGraw Hill.
 - JAVA: The Complete Reference, Herbert Schildt, McGraw Hill Education.
 - JAVA-2: The Complete Reference, Patrick Naughton, Herbert Schidt.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the available features in Java programming language.
 - CO2. illustrate Java programming concepts for solving problems.
 - CO3. make use of the Java programming methods for connecting the various databases.
 - CO4. test for bugs in a software application written in the Java programming language.
 - CO5. determine different ways for handling exceptions, memory management, file handling, i/o management and internet based application development.
 - CO6. build a project for application development using Java programming language.
-

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Department of Information Technology

COMPUTER GRAPHICS & MULTIMEDIA
160411

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To provide an introduction to the theory and practice of computer graphics.
 - To give a good exposure related to Computer Graphics algorithms and to design various graphics primitives.
 - To enhance the proficiency in programming skills related to animation and graphics object design
-

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image representation, Line drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D object on Screen, Parallel and Perspective Projections.

Unit-IV

Clipping: Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc, Polygon Clipping, Convex and Concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc, Hidden Surface Elimination: Z- Buffer algorithm and Painter's Algorithm, Area Filling, Basic

MA

Department of Information Technology

Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models like RGB, YIQ, CMY, HSV etc.

Unit-V

Multimedia System: An Introduction, Multimedia hardware, Multimedia System Architecture, Multimedia Authoring. Data & File Format standards: RTF, TIFF, MIDI, JPEG, DIB, MPEG. Audio: digital audio, MIDI, processing sound, sampling, compression. Video: AVI, 3GP, MOV, MPEG, compression standards, compression through spatial and temporal redundancy.

RECOMMENDED BOOKS

- Donald Hearn and M.P. Becker : Computer Graphics, PHI Publication
 - FoleyVandam, Feiner, Hughes : Computer Graphics principle and Practice
 - Rogers : Principles of Computers Graphics, TMH
 - Sinha and Udai : Computer Graphics, TMH
 - Prabhat K. Andleigh, Kiran Thakrar : Multimedia Systems Design, Prentice Hall PTR
-

COURSE OUTCOMES

After completion of the course students will be able to:

- CO1. explain interactive computer graphics, various display devices and explore applications of computer graphics.
 - CO2. illustrate various line generations, circle generation, curve generation and shape generation algorithms.
 - CO3. apply various 2-dimensional and 3-dimensional transformations and projections on images.
 - CO4. classify methods of image clipping and various algorithms for line and polygon clipping.
 - CO5. choose appropriate filling algorithms, hidden surface elimination algorithm and apply on various images.
 - CO6. discuss various color models, shading methods and multimedia.
-

V.K.

Department of Information Technology

SOFTWARE ENGINEERING
160412

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
 - To understand project management and risk management associated with various types of projects.
 - To know basics of testing and understanding concept of software quality assurance and software configuration management process.
-

Unit - I

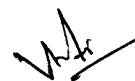
Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, **Software Model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection Criteria of Model:** Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.



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Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, **Project Management-** Basics-People, Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the various fundamental concepts of software engineering.
 - CO2. develop the concepts related to software design & analysis.
 - CO3. compare the techniques for software project management & estimation.
 - CO4. choose the appropriate model for real life software project.
 - CO5. design the software using modern tools and technologies.
 - CO6. test the software through different approaches.
-

V.A.J.

Department of Information Technology

COMPUTER NETWORKS
160413

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
 - Provide detail knowledge about various layers, protocols and devices that facilitate networking.
 - Enable Students to deal with various networking problems such as flow control, error control and congestion control.
-

Unit-I

Introduction: Computer Network, Types- LAN, MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network Topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing.

Unit-III

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- The Channel Allocation Problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

V.A.S.

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Unit-IV

Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session& Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the fundamental concepts of computer network.
 - CO2. illustrate the basic taxonomy & terminologies of computer network.
 - CO3. Identify various parameter for affecting the performance of computer network.
 - CO4. analyze the concepts of communication using various layer of OSI model.
 - CO5. evaluate the performance of computer network in congestion and Internet.
 - CO6. design the network environment and applications for implementation of computer networking concept.
-

V.A.

Department of Information Technology

CYBER SECURITY
100004

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide an understanding of cyber security fundamentals.
- To analyse various cyber-attacks and their countermeasures.
- To provide basics of Internet and networking.
- To identify various cyber security threats and vulnerabilities.
- To apply forensic science to investigate a cybercrime.

Unit-I

Introduction- Overview of Cyber Security, Cyber Crime, Cyber Warfare, Cyber Terrorism, Cyber Espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software Piracy.

Unit-II

Basics of Internet & Networking- Wired and Wireless Networks, Internetworking Devices, Topologies, Web Browser, Web Server, OSI Model, IP Addressing, Firewall, E-Commerce, DNS, NAT, VPN, HTTP & HTTPS.

Unit-III

Cryptography and Network Security- Security Principles, Attacks, Cryptography, Steganography, Cryptanalysis, Symmetric Key and Public Key Cryptography, Digital Signature, Intrusion Detection System, Secure Socket Layer(SSL) & Secure Electronic Transaction(SET).

Unit-IV

Cyber Security Threats and Vulnerabilities- Hacker, Types of Hacker- White, Gray and Black, **Malicious Software's:** Virus, Worm, Trojan Horse, Backdoors and Spywares. Sniffers, Denial of Service Attack and Phishing.

Unit-V

Cyber Crime Investigation and Legal Issues: Intellectual Property, Privacy Issues, IT Act 2000, Basics of Cyber Crime Investigation- Cyber Forensics, Electronic Evidences and its Types.

VA

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RECOMMENDED BOOKS:

- Cryptography and Network Security, 4/E, William Stallings, 4th edition, Pearson publication
 - Computer Security: Principles and Practice, Stallings William, Pearson publication
 - Investigating Network Intrusions and Cybercrime, EC-Council Press
 - Network Forensics, Tracking Hackers through Cyberspace, Sherri Davidoff, Jonathan Ham, Prentice Hall.
 - Cryptography and Network Security, 3e, Atul Kahate, McGraw Hill publication.
-

COURSE OUTCOMES:

After completion of the course students would be able to:

- CO1. tell the basic terminologies of cyber security.
 - CO2. explain the basic concept of networking and internet.
 - CO3. apply various methods used to protect data in the internet environment in real world situations.
 - CO4. discover the concept of IP security and architecture.
 - CO5. compare various types of cyber security threats/vulnerabilities.
 - CO6. develop the understanding of cybercrime investigation and IT ACT 2000.
-

V.K.

Department of Information Technology

PYTHON PROGRAMMING LAB

160414

L	T	P	Total Credits
-	1	2	2

COURSE OBJECTIVES

- Implement an algorithm in Python by using standard programming constructs such as, functions, modules, aggregated data (arrays, lists, etc.)
- Explain the output of a given Python program and identify and correct errors in a given Python program
- Write programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc.

Unit-I

Introduction to Python programming language Data and Expressions: Literals; Variables and Identifiers; Operators; Expressions and Data Types, Logical operator; Boolean operator; Boolean Expressions; Control Structures; Selection Control, Iterative Control. Lists & tuples: List Structures; Lists in Python, Iterating over Lists in Python.

Unit-II

Functions: Arguments in functions; Program routes; Calling Value Returning Functions; Calling Non- value Returning Functions Parameter Passing; Variable Scope; Modular design Modules; Top-Down Design Python Modules; File Handling Operation in file: Reading, Writing and appending in Text Files.

Unit-III

String Processing; Dictionaries and sets operations; Exception Handling: Exceptions Data Collections applying lists etc.

Unit-IV

Introduction to Object Oriented Programming, Class, Objects, Encapsulation, Data abstraction, Inheritance, Polymorphism.

Unit-V

Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics, Displaying Images, Generating Colors, Graphics Objects, Entry Objects, Test Case: Numpy, scipy; Test Case: panda, Matplotlib.



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RECOMMENDED BOOKS

- C. Dierbach, Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus (1st ed.), Wiley, 2015. ISBN 978-8126556014.
- Yashavant Kanetkar, Let Us Python (1st ed.), BPB Publishers, 2019. ISBN 978-9388511568

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. solve computational problem using python language
 - CO2. familiar with basics syntax and features of python programming language
 - CO3. hands on experience to online coding tools like colab.
 - CO4. design a program utilizing the features of object oriented concept.
 - CO5. utilize some of the libraries available for solving problems.
-



Department of Information Technology

ANNEXURE - VII

***Scheme
of
B. Tech. I & II Semester
(Information Technology / Internet of Things
(IoT) / Artificial Intelligence & Robotics)
(Batch Admitted in 2020-21)
Under Flexible Curriculum
[ITEM - 7]***

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. in Internet of Things (IoT)

I Semester

For batches admitted in academic session 2020 – 21

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230101	DC	Introduction to Internet of Things (IoT)	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3/1)	MCQ
2.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				250	50	100	100	120	40	40	700	14	03	04		-	-

Induction program of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Lab		Theory			Lab		
Offline	Online	Blended		Offline	PP	A+O	MCQ		SO
		Offline	Online						
07	03	05	02	02	07	03	07	02	19
36.84%	15.78%	26.32	10.53%	10.53%	36.84%	15.78%	36.84%	10.53%	Credits %

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Internet of Things (IoT)

II Semester

For batches admitted in academic session 2020-21

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230201	DC	Digital Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	220202	DC	Sensor Technology	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
3.	230202	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
4.	230203	DC	Object Oriented Programming and Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
Total				250	50	100	100	240	80	80	900	14	01	08	19	-	-

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Blended		Lab	Theory				Lab
Offline	Online	Offline	Online	Offline	PP	A+O	MCQ		SO
9	-	4	2	4	12	3	-	4	19
47.37%	-	21.05%	10.53%	21.05%	63.15%	15.78%	-	21.05%	Credits %

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

I Semester

For batches admitted in academic session 2020 – 21

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	240101	DC	Introduction to Artificial Intelligence	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3/1)	MCQ
2.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
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5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				250	50	100	100	120	40	40	700	14	03	04		-	-

Induction program of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Lab		Theory			Lab		
Offline	Online	Blended		Offline	PP	A+O	MCQ		SO
		Offline	Online						
07	03	05	02	02	07	03	07	02	
36.84%	15.78%	26.32	10.53%	10.53%	36.84%	15.78%	36.84%	10.53%	
Credits %									

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

II Semester

For batches admitted in academic session 2020 – 2021

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				End Sem. Exam.	Practical Slot			L	T	P			
				End Term Evaluation		Continuous Evaluation			Continuous Evaluation								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230201	DC	Digital Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	220202	DC	Sensor Technology	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
3.	230202	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
4.	230203	DC	Object Oriented Programming and Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
Total				250	50	100	100	240	80	80	900	14	01	08		-	

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Blended		Lab	Theory				Lab
Offline	Online	Offline	Online	Offline	PP	A+O	MCQ		SO
9	-	4	2	4	12	3	-		4
47.37%	-	21.05%	10.53%	21.05%	63.15%	15.78%	-	21.05%	Credits %

M

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester (Information Technology)

For batches admitted in academic session 2020 – 21

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
2.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
3.	100020	ESC	Basic Civil Engineering & Mechanics	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
4.	100021	ESC	Basic Mechanical Engineering	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	MCQ
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
6.	160111	DLC	IT workshop	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO
Total				250	50	100	100	180	80	40	800	11	04	08		-	-

Induction program of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Lab		Theory			Lab		
Offline	Online	Blended		Offline	PP	A+O	MCQ		SO
		Offline	Online						
03	03	06	03	04	06	03	06	04	19
15.79%	15.79%	31.58%	15.79%	21.05%	31.58%	15.79%	31.58%	21.05%	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. II Semester (Information Technology)

For batches admitted in academic session 2020 – 21

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	100011	BSC	Engineering Mathematics –I	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	160211	DC	Data Structures	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
3.	160212	DC	Object Oriented Programming & Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
4.	160213	DC	Digital Electronics	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
Total				250	50	100	100	180	60	60	800	13	03	06		-	-

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

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MCQ: Multiple Choice Question

AO: Assignment + Oral

OB: Open Book

PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Credits %	
Theory			Lab	Theory			Lab		
Offline	Online	Blended		Offline	PP	A+O	MCQ		SO
		Offline	Online						
10	-	04	02	03	13	03	-	03	
52.63%		21.05%	10.53%	15.79%	68.42%	15.79%		15.79%	

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Department of Information Technology

ANNEXURE - VIII

Scheme
of
B. Tech. I & II Semester
(Information Technology / Internet of Things
(IoT) / Artificial Intelligence & Robotics)
(Batch Admitted in 2021-22)
Under Flexible Curriculum
[ITEM - 7]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. in Internet of Things (IoT)

I Semester

For batches admitted in academic session 2021 – 22 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230101	DC	Introduction to Internet of Things (IoT)	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3/1)	MCQ
2.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				250	50	100	100	120	40	40	700	14	03	04		-	-

Induction program of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits
Theory		Lab		Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	
		Offline	Online					
07	03	05	02	02	07	03	07	02
36.84%	15.78%	26.32	10.53%	10.53%	36.84%	15.78%	36.84%	10.53%
Credits %								

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. in Internet of Things (IoT)

II Semester

For batches admitted in academic session 2021 –22 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230201	DC	Digital Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	220202	DC	Sensor Technology	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
3.	230202	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
4.	230203	DC	Object Oriented Programming and Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
Total				250	50	100	100	240	80	80	900	14	01	08		-	-

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Blended		Lab	Theory				Lab
Offline	Online	Offline	Online	Offline	PP	A+O	MCQ		SO
9	-	4	2	4	12	3	-		4
47.37%		21.05%	10.53%	21.05%	63.15%	15.78%	-	21.05%	
19									
Credits %									

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

I Semester

For batches admitted in academic session 2021 – 22 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	240101	DC	Introduction to Artificial Intelligence	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3/1)	MCQ
2.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				250	50	100	100	120	40	40	700	14	03	04		-	-

Induction program of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

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MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Lab		Theory			L..b		
Offline	Online	Blended		Offline	PP	A+O	MCQ		SO
		Offline	Online						
07	03	05	02	02	07	03	07	02	19
36.84%	15.78%	26.32	10.53%	10.53%	36.84%	15.78%	36.84%	10.53%	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

II Semester

For batches admitted in academic session 2021 – 2022 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assign ment		Lab work & Sessional	Skill Based Mini Project							
1.	230201	DC	Digital Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	220202	DC	Sensor Technology	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
3.	230202	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
4.	230203	DC	Object Oriented Programming and Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
Total				250	50	100	100	240	80	80	900	14	01	08		-	-

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Mode of Teaching				Mode of Examination				Total Credits	
Theory		Lab		Theory			Lab		
Offline	Online	Blended		Offline	PP	A+O	MCQ		SO
9	-	Offline	Online	4	12	3	-	4	
47.37%	-	21.05%	10.53%	21.05%	63.15%	15.78%	-	21.05%	Credits %

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester (Information Technology)

For batches admitted in academic session 2021 – 22 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
2.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
3.	100020	ESC	Basic Civil Engineering & Mechanics	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
4.	100021	ESC	Basic Mechanical Engineering	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	MCQ
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
6.	160111	DLC	IT workshop	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO
Total				250	50	100	100	180	80	40	800	11	04	08		-	-

Induction program of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

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MCQ: Multiple Choice Question

AO: Assignment + Oral

OB: Open Book

PP: Pen Paper

SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory			Lab	Theory			Lab		
Offline	Online	Blended		Offline	PP	A+O	MCQ		SO
		Offline	Online						
03	03	06	03	04	06	03	06	04	19
15.79%	15.79%	31.58%	15.79%	21.05%	31.58%	15.79%	31.58%	21.05%	Credits %

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. II Semester (Information Technology)

For batches admitted in academic session 2021 – 22 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	^s Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	100011	BSC	Engineering Mathematics –I	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	160211	DC	Data Structures	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
3.	160212	DC	Object Oriented Programming & Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
4.	160213	DC	Digital Electronics	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
Total				250	50	100	100	180	60	60	800	13	03	06		-	-

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

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MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Blended		Lab	Theory		Lab		
Offline	Online	Offline	Online	Offline	PP	A+O	MCQ		SO
10	-	04	02	03	13	03	-		03
52.63%	-	21.05%	10.53%	15.79%	68.42%	15.79%	-	15.79%	Credits %

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MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - IX

Experiments List/Lab manuals
of
Laboratory Courses
B.Tech V & VII Semester
(Information Technology)
Under Flexible Curriculum
[ITEM-8]



SOFTWARE ENGINEERING
160502

LIST OF EXPERIMENTS

Experiment 1: Identify the requirements from problem statements

Requirements, Characteristics of Requirements, Categorization of Requirements, Functional Requirements, Identifying Functional Requirements

Experiment 2: Estimation of project metrics using estimation techniques like COCOMO model

Project Estimation Techniques, COCOMO, Basic COCOMO Model, Intermediate COCOMO Model, Complete COCOMO Model, Advantages of COCOMO, Drawbacks of COCOMO, Halstead's Complexity Metrics

Experiment 3: Modeling UML Use Case diagrams and capturing Use Case Scenarios

Use case diagrams, Actor, Use Case, Subject, Graphical Representation, Association between Actors and Use Cases, Use Case Relationships, Include Relationship, Extend Relationship, Generalization Relationship, Identifying Actors, Identifying Use cases, Guidelines for drawing Use Case diagrams

Experiment 4: E-R modeling from the problem statements

Entity Relationship Model, Entity Set and Relationship Set, Attributes of Entity, Keys, Weak Entity, Entity Generalization and Specialization, Mapping Cardinalities, ER Diagram, Graphical Notations for ER Diagram, Importance of ER modeling

Experiment 5: Modeling UML Class diagrams and Sequence diagrams

Structural and Behavioral aspects, Class diagram, Elements in class diagram, Class, Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages

Experiment 6: Modeling Data Flow diagrams

Data Flow Diagram, Graphical notations for Data Flow Diagram, Explanation of Symbols used in DFD, Context diagram and leveling DFD

Experiment 7: Create flow chart for an algorithm using Raptor

Assignment, Call, Input, Output, Selection and Loop symbols.

Experiment 8: Estimation of Test coverage metrics and structural complexity

Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits.

Experiment 9: Designing Test Suites

Software Testing, Standards for Software Test Documentation, Testing Frameworks, Need for Software Testing, Test Cases and Test Suite, Types of Software Testing, Unit Testing, Integration Testing, System Testing, Example, Some Remarks.



RECOMMENDED TOOLS

- Selenium
- Star UML
- UMLet
- Raptor

REFERENCE

- Virtual Labs (<http://vlabs.iitkgp.ernet.in/se/>)

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: demonstrate the basic concept of UML.
 - CO2: discuss the software development process using different tools.
 - CO3: display the various ways for solving different common modelling problems using UML.
 - CO4: use the knowledge of Software engineering and project management.
 - CO5: identify the vocabulary, rules and idioms of the UML and learn how to model it effectively.
 - CO6: design the software systems using software engineering concepts.
-

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THEORY OF COMPUTATION
160503

LIST OF PROGRAMS

1. Design a Program for creating machine that accepts three consecutive one.
2. Design a Program for creating machine that accepts the string always ending with 101.
3. Design a Program for Mode 3 Machine
4. Design a program for accepting decimal number divisible by 2.
5. Design a program for creating a machine which accepts string having equal no. of 1's and 0's.
6. Design a program for creating a machine which count number of 1's and 0's in a given string.
7. Design a Program to find 2's complement of a given binary number.
8. Design a Program which will increment the given binary number by 1.
9. Design a Program to convert N DFA to DFA.
10. Design a Program to create PDA machine that accept the well-formed parenthesis.
11. Design a PDA to accept WCW^R where w is any string and W^R is reverse of that string and C is a Special symbol.
12. Design a Turing machine that's accepts the following language $a^n b^n c^n$ where $n > 0$.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: judge various computational models.
 - CO2: construct abstract models of computing.
 - CO3: justify the power of abstract models in computing to recognize the languages.
 - CO4: demonstrate analytical thinking and intuition for problem solving in the related areas.
 - CO5: discuss the limitations of computation in problem solving.
 - CO6: follow set of rules for syntax verification.
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MICROPROCESSOR & INTERFACING
160504

LIST OF EXPERIMENTS

1. Write an assembly language program to perform the addition of two 8-bit number using 8085/8086 instruction set.
2. Write an assembly language program to find the sum of numbers in array of data using 8085/8086 instruction set.
3. Write an assembly language program to perform the subtraction of two 8-bit number using 8085/8086 instruction set.
4. Write an assembly language program to move data block starting at location 'X' to location 'Y' without overlap using 8085/8086 instruction set.
5. Write an assembly language program to arrange set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address data field using 8085/8086 instruction set.
6. Write an assembly language program to perform the multiplication of two 8-bit numbers using 8085/8086 instruction set.
7. Write an assembly language program to find the larger number in array of data using 8085/8086 instruction set.
8. Write an assembly language program to perform the division of two 8-bit numbers using 8085/8086 instruction set.
9. Write an assembly language program to convert two BCD numbers in memory of the equivalent HEX number using 8085/8086 instruction set.
10. Write an assembly language program to convert given hexadecimal number into its equivalent BCD number using 8085/8086 instruction set.
11. Write an assembly language program to convert given hexadecimal number into its equivalent ASCII number using 8085/8086 instruction set.
12. Write an assembly language program to convert given ASCII character into its equivalent hexadecimal number using 8085/8086 instruction set.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: differentiate the various types of instructions and addressing modes.
 - CO2: identify the Hex code/ Machine code of instructions in assembly language.
 - CO3: perform interfacing of various peripheral devices and memory with microprocessor.
 - CO4: demonstrate the arithmetic & Logical operation using instruction set of 8086/8051 microprocessor.
 - CO5: use of 8086/8051 for interfacing with I/O devices.
 - CO6: build the assembly language programs in 8086/8051 to solve real world problems.
-

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DEPARTMENT OF INFORMATION TECHNOLOGY

Internet of Things (IoT)

LAB MANUAL



MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

DEPARTMENT OF INFORMATION TECHNOLOGY

Internet of Things (IoT) LAB

Syllabus

Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor based application through embedded system platform, Implementing IoT concepts with python

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1.** demonstrate the concepts of IoT.
- CO2.** use of different technology related to IoT.
- CO3.** relate the IoT to different applications.
- CO4.** examine the protocols used in IoT.
- CO5.** judge the data received through sensors in IoT.
- CO6.** develop smart applications in IoT.

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Internet of Things (IoT)

LAB EXPERIMENTS LIST

Design, Develop and implement following using Arduino, Raspberry Pi and Python language in Linux/Windows environment.

1. Write an Arduino program to print numbers from 0 to 9 on 7 segment display
2. Write an Arduino program to make different patterns (At least two) on 8x8 LED matrix
3. Design smart home security system using motion sensor enabled smart light
4. Write a program to record data from sensor DHT 11 and display it on LCD
5. Write ARM code for LPC 2138 IC to control a LED using switch
6. Write ARM code for LPC 2138 IC to blink a series of LED'S in forward and reverse direction
7. Write an ARM 7 program to show a message on LCD Display.
8. Write an ARM 7 program to show current time on LCD using RTC module
9. Write a program using Raspberry pi to implement Traffic light System
10. Write a program to control remote peripherals motor using email Server
11. Control raspberry pi remotely Through SSH
12. Write a program Using Raspberry-pi for Smart-Phone-Home-Automation
13. To check the sensor communication with node's and observes Data serially
14. To check the data on recorded MQTT Cloud Server
15. To change the Wi-Fi SSID and Password of ESP8266 Wi-Fi module



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DOs and DON'Ts in Laboratory:

1. Make entry in the Log Book as soon as you enter the Laboratory.
2. All the students should sit according to their roll numbers starting from their left to right.
3. All the students are supposed to enter the H/W kit/terminal number in the log book.
4. Do not change the kit/terminal on which you are working.
5. All the students are expected to get at least the algorithm of the program/concept to be implement.
6. Strictly follow the instructions given by the teacher/Lab Instructor.

Instruction for Laboratory Teachers:

1. Submission related to whatever lab work has been completed should be done during the next lab session.
2. The immediate arrangements for printouts related to submission on the day of practical assignments.
3. Students should be taught for taking the printouts under the observation of lab teacher.
4. The promptness of submission should be encouraged by way of marking and evaluation patterns that will benefit the sincere students.



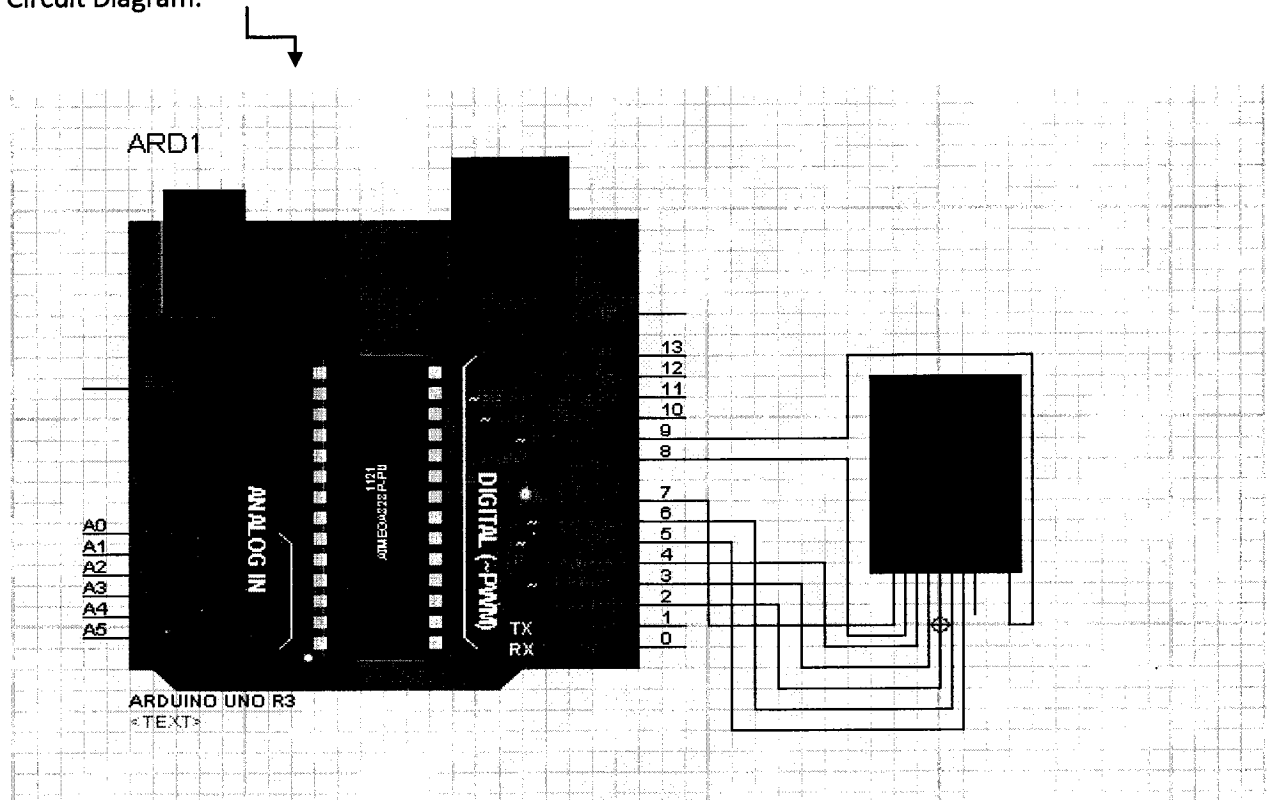
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EXPERIMENT-01

Aim: Write an Arduino program to print numbers from 0 to 9 on 7 segment display

Requirements: Arduino Uno module, 7 segments Display, jumper wires, Bread Board, 5V power supply

Circuit Diagram:



Example Code: →

```
//e = 2;  
//d = 3;  
//c = 4;  
//g = 5;  
//f = 6;  
//a = 7;  
//b = 8;  
int num[10][7]={ {0,0,0,1,0,0,0},  
                  {1,1,0,1,1,1,0},  
                  {0,0,1,0,1,0,0},  
                  {1,0,0,0,1,0,0},  
                  {1,1,0,0,0,1,0},  
                  {1,0,0,0,0,0,1},
```

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```
{0,0,0,0,0,1,1},
{1,1,0,1,1,0,0},
{0,0,0,0,0,0,0},
{1,0,0,0,0,0,0}
};

void setup()
{
    pinMode(2,OUTPUT);
    pinMode(3,OUTPUT);
    pinMode(4,OUTPUT);
    pinMode(5,OUTPUT);
    pinMode(6,OUTPUT);
    pinMode(7,OUTPUT);
    pinMode(8,OUTPUT);
    pinMode(9,OUTPUT);
    digitalWrite(2,HIGH);
    digitalWrite(3,HIGH);
    digitalWrite(4,HIGH);
    digitalWrite(5,HIGH);
    digitalWrite(6,HIGH);
    digitalWrite(7,HIGH);
    digitalWrite(8,HIGH);
    digitalWrite(9,HIGH);
}

void loop()
{
    for(int i=0;i<10;i++)
    {
        for(int j=0;j<7;j++)
        {
            digitalWrite(j+2,num[i][j]);
        }
        delay(1000);
    }
}
```

Observations →



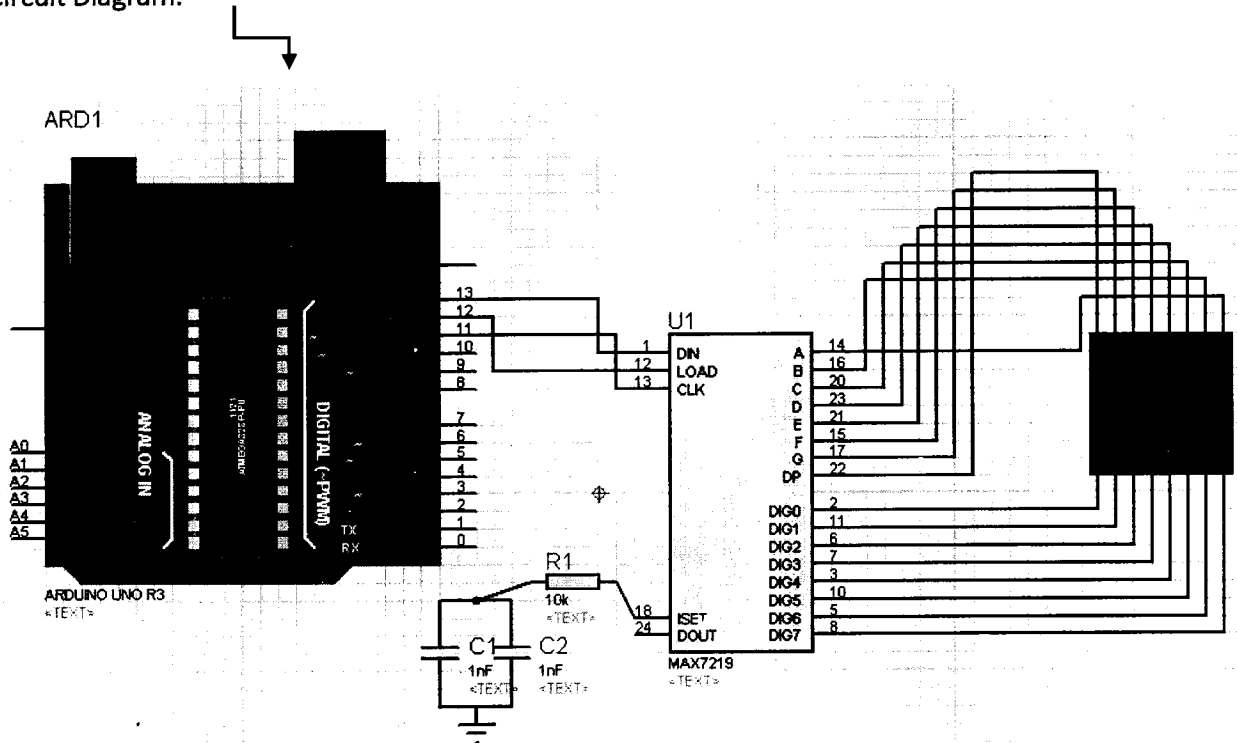
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EXPERIMENT-02

Aim: Write an Arduino program to make different patterns (At least two) on 8x8 LED matrix.

Requirements: Arduino Uno module, 8X8 Led matrix display, jumper wires, Resistance

Circuit Diagram:



Example Code: ➔

```
#include <LedControl.h>
int DIN = 13;
int CS = 12;
int CLK = 11;
byte E[8] = {0x3C,0x20,0x20,0x3C,0x20,0x20,0x20,0x3C};
byte L[8] = {0x20,0x20,0x20,0x20,0x20,0x20,0x20,0x3E};
byte C[8] = {0x1C,0x20,0x20,0x20,0x20,0x20,0x20,0x1C};
byte T[8] = {0x7C,0x10,0x10,0x10,0x10,0x10,0x10,0x10};
byte R[8] = {0x38,0x24,0x24,0x28,0x30,0x28,0x24,0x24};
byte O[8] = {0x1C,0x22,0x22,0x22,0x22,0x22,0x22,0x1C};
byte N[8] = {0x42,0x62,0x52,0x52,0x4A,0x46,0x46,0x42};
byte I[8] = {0x38,0x10,0x10,0x10,0x10,0x10,0x10,0x38};
byte S[8] = {0x1C,0x20,0x20,0x10,0x08,0x04,0x04,0x38};
byte H[8] = {0x22,0x22,0x22,0x3E,0x22,0x22,0x22,0x22};
```

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```
byte U[8] = {0x22,0x22,0x22,0x22,0x22,0x22,0x22,0x1C,};  
byte B[8] = {0x38,0x24,0x24,0x38,0x38,0x24,0x24,0x38};  
byte smile[8]= {0x3C,0x42,0xA5,0x81,0xA5,0x99,0x42,0x3C};  
byte neutral[8]= {0x3C,0x42,0xA5,0x81,0xBD,0x81,0x42,0x3C};  
byte frown[8]= {0x3C,0x42,0xA5,0x81,0x99,0xA5,0x42,0x3C};
```

```
LedControl lc = LedControl(DIN,CLK,CS,1);
```

```
void setup(){
```

```
    ic.shutdown(0,false);
```

```
    lc.setIntensity(0,5);
```

```
    lc.clearDisplay(0);
```

```
}
```

```
void loop()
```

```
{
```

```
    printByte(smile);
```

```
    delay(1000);
```

```
    printByte(neutral);
```

```
    delay(1000);
```

```
    printByte(frown);
```

```
    delay(1000);
```

```
    printByte(E);
```

```
    delay(1000);
```

```
    printByte(L);
```

```
    delay(1000);
```

```
    printByte(E);
```

```
    delay(1000);
```

```
    printByte(C);
```

```
    delay(1000);
```

```
    printByte(T);
```

```
    delay(1000);
```

```
    printByte(R);
```

```
    delay(1000);
```

```
    printByte(O);
```

```
    delay(1000);
```

```
    printByte(N);
```

```
    delay(1000);
```

```
    printByte(I);
```

```
    delay(1000);
```

```
    printByte(C);
```

```
    delay(1000);
```

```
    printByte(S);
```

```
    delay(1000);
```

```
    lc.clearDisplay(0);
```

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```
delay(1000);
printByte(H);
delay(1000);
printByte(U);
delay(1000);
printByte(B);
delay(1000);
lc.clearDisplay(0);
delay(1000);
}
void printByte(byte character [])
{
    int i = 0;
    for(i=0;i<8;i++)
    {
        lc.setRow(0,i,character[i]);
    }
}
```

Observations →

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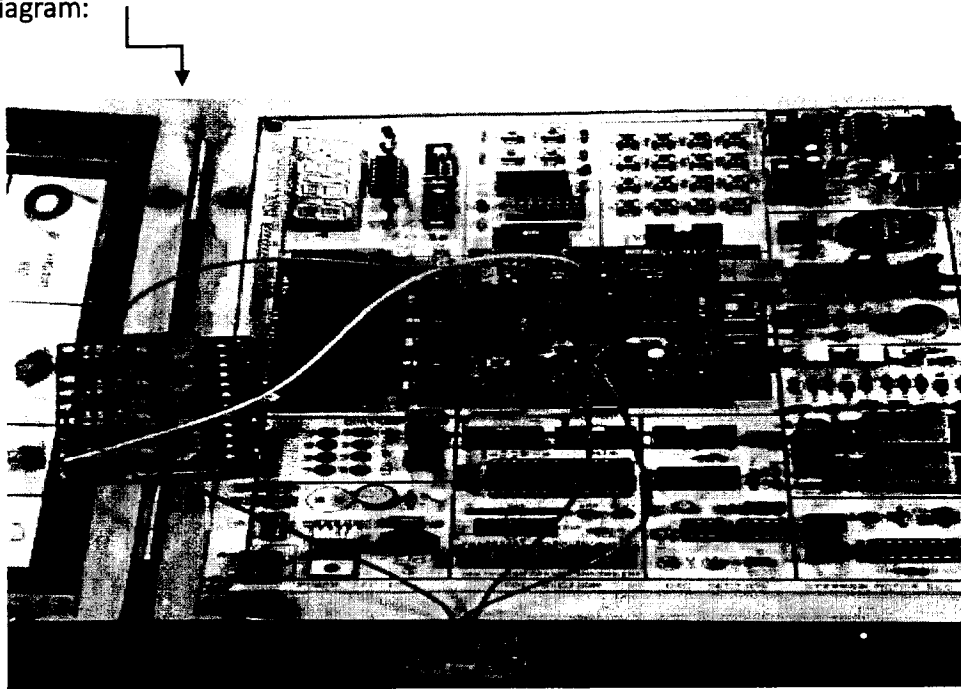
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Project Title:

Aim: Design smart home security system using motion sensor enabled smart light

Requirements: AVR/ARM/PIC, USB programmer, PIR motion sensor, LEDs

Circuit Diagram:



Example Code: →

```
#define F_CPU 8000000UL
#include <avr/io.h>
#define LED_OUTPUT PORTB
#define PIR_Input PINC
int main(void)
{
    DDRC = 0x00 ;
    DDRB = 0xff ;
    while ( 1 )
    {
        LED_OUTPUT = PIR_Input;
    }
}
```

Observations →

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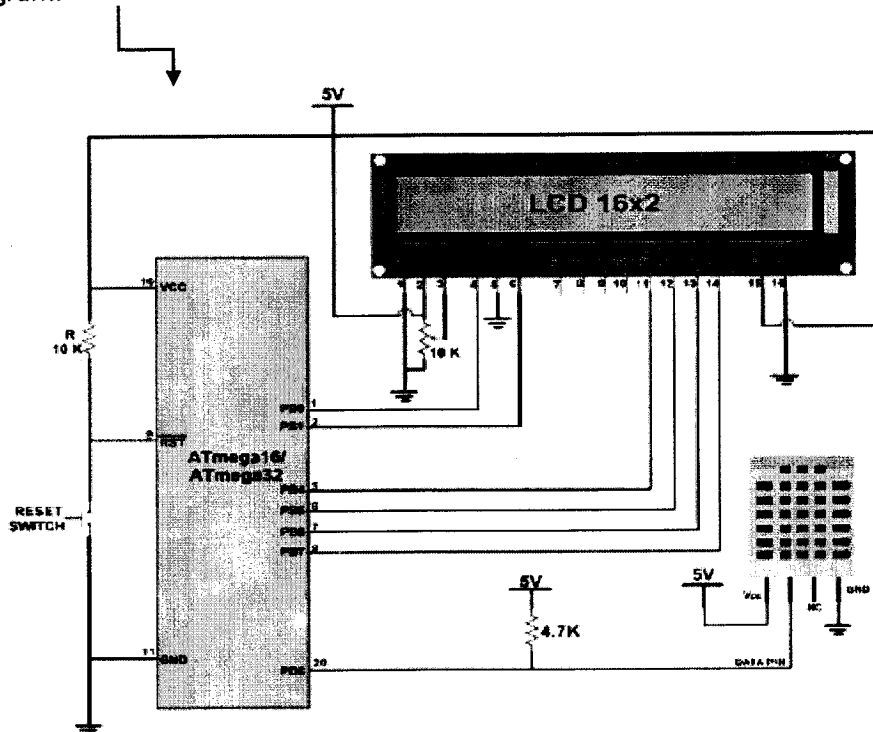
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EXPERIMENT-04

Aim: Write a program to record data from sensor DHT 11 and display it on LCD

Requirements: AVR/ARM/PIC, USB programmer, Temperature- Humidity Sensor, LCD display

Circuit Diagram:



Example Code: →

```
#include <avr/io.h>
#include <stdlib.h>
#include <stdio.h>
#include "LCD16x2_4bit.h"
#define DHT11_PIN 6
uint8_t c= 0 ,I_RH,D_RH,I_Temp, D_Temp, CheckSum;
void Request() /* Microcontroller send start pulse/request */
{
    DDRD |= ( 1 <<DHT11_PIN);
    PORTD &= ~( 1 <<DHT11_PIN); /* set to low pin */
    _delay_ms( 20 ); /* wait for 20ms */
    PORTD |= ( 1 <<DHT11_PIN); /* set to high pin */
}
void Response() /* receive response from DHT11 */
{
    DDRD &= ~( 1 <<DHT11_PIN);
```

V.V.



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```
while (PIND & ( 1 <<DHT11_PIN));
while ((PIND & ( 1 <<DHT11_PIN))== 0 );
while (PIND & ( 1 <<DHT11_PIN));
}
uint8_t Receive_data() /* receive data */
{
    for ( int q= 0 ; q< 8 ; q++)
    {
        while ((PIND & ( 1 <<DHT11_PIN)) == 0 ); /* check received bit 0 or 1 */
        delay_us( 30 );
        if (PIND & ( 1 <<DHT11_PIN)) /* if high pulse is greater than 30ms */
            c = (c<< 1)|( 0x01 ); /* then its logic HIGH */
        else /* otherwise its logic LOW */
            c = (c<< 1);
        while (PIND & ( 1 <<DHT11_PIN));
    }
    return c;
}
int main(void)
{
    char data[ 5 ];
    lcdinit(); /* Initialize LCD */
    lcd_clear(); /* Clear LCD */
    lcd_gotoxy( 0 , 0 ); /* Enter column and row position */
    lcd_print( "Humidity =" );
    lcd_gotoxy( 0 , 1 );
    lcd_print( "Temp = " );
    while ( 1 )
    {
        Request(); /* send start pulse */
        Response(); /* receive response */
        I_RH=Receive_data(); /* store first eight bit in I_RH */
        D_RH=Receive_data(); /* store next eight bit in D_RH */
        I_Temp=Receive_data(); /* store next eight bit in I_Temp */
        D_Temp=Receive_data(); /* store next eight bit in D_Temp */
        CheckSum=Receive_data(); /* store next eight bit in CheckSum */
        if ((I_RH + D_RH + I_Temp + D_Temp) != CheckSum)
        {
            lcd_gotoxy( 0 , 0 );
            lcd_print( "Error" );
        }
        else
        {
            itoa(I_RH,data, 10 );
            lcd_gotoxy( 11 , 0 );
            lcd_print(data);
        }
    }
}
```

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```
lcd_print( "." );
itoa(D_RH,data, 10 );
lcd_print(data);
lcd_print( "%" );
itoa(I_Temp,data, 10 );
lcd_gotoxy( 6 , 1 );
lcd_print(data);
lcd_print( "." );
itoa(D_Temp,data, 10 );
lcd_print(data);
lcddata( 0xDF );
lcd_print( "C " );
itoa(CheckSum,data, 10 );
lcd_print(data);
lcd_print( " " );
    }
    _delay_ms( 10 );
}
}
```

Observations →

V.A.



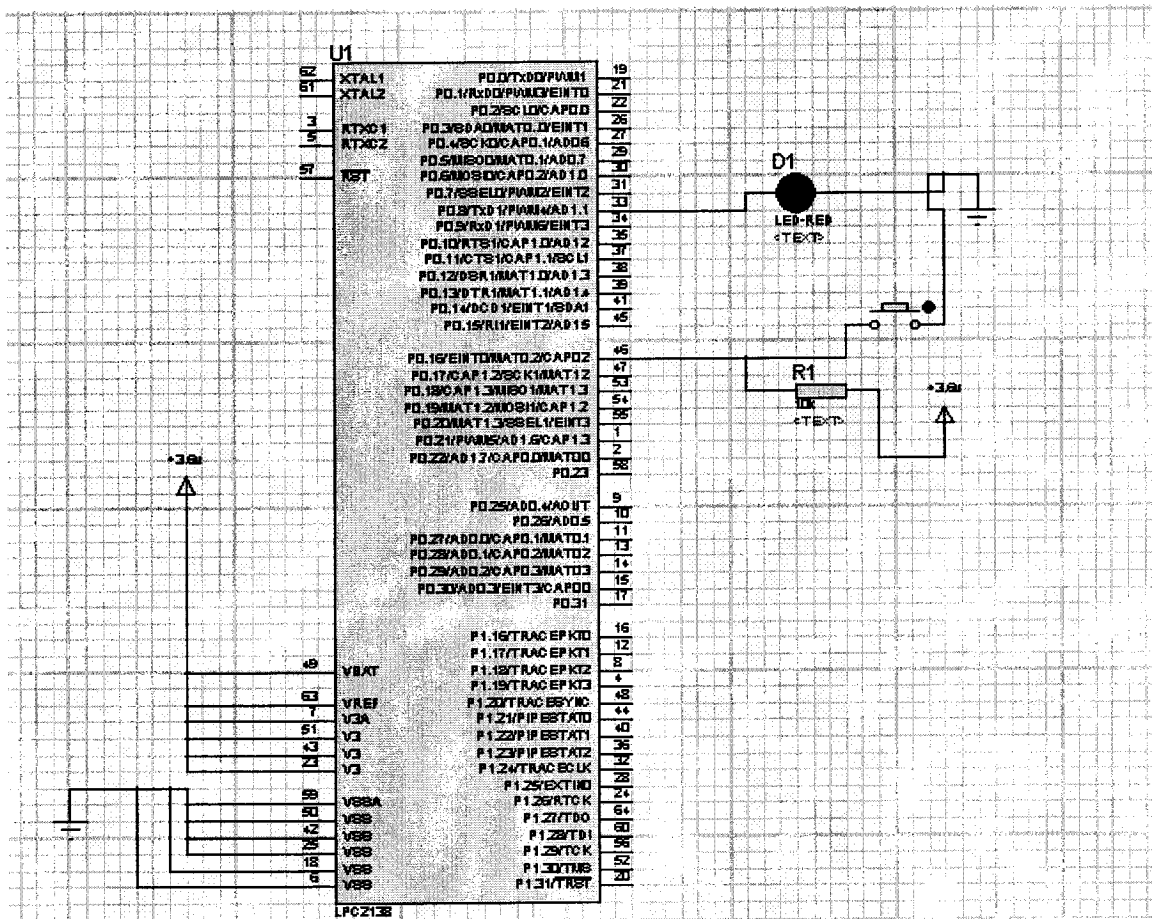
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EXPERIMENT-05

Aim: Write ARM code for LPC 2138 IC to control a LED using switch

Requirements: LPC 2138 IC, Led's, push button, Jumper Wires, Bread Board, 5v power supply, Resistance

Circuit Diagram:



Example Code: ➔

```
#include <LPC213X.H>
int main()
{
    IODIR0=~(1<<16);//sw
```

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```
IODIRO={1<<8}; //led
IOCLRO=0xffffffff;
while(1)
{
    if(!(IOPIN0&(1<<16)))
    {
        IOSET0={1<<8};
    }
    else
    {
        IOCLRO={1<<8};
    }
}
```

Observations →

WA



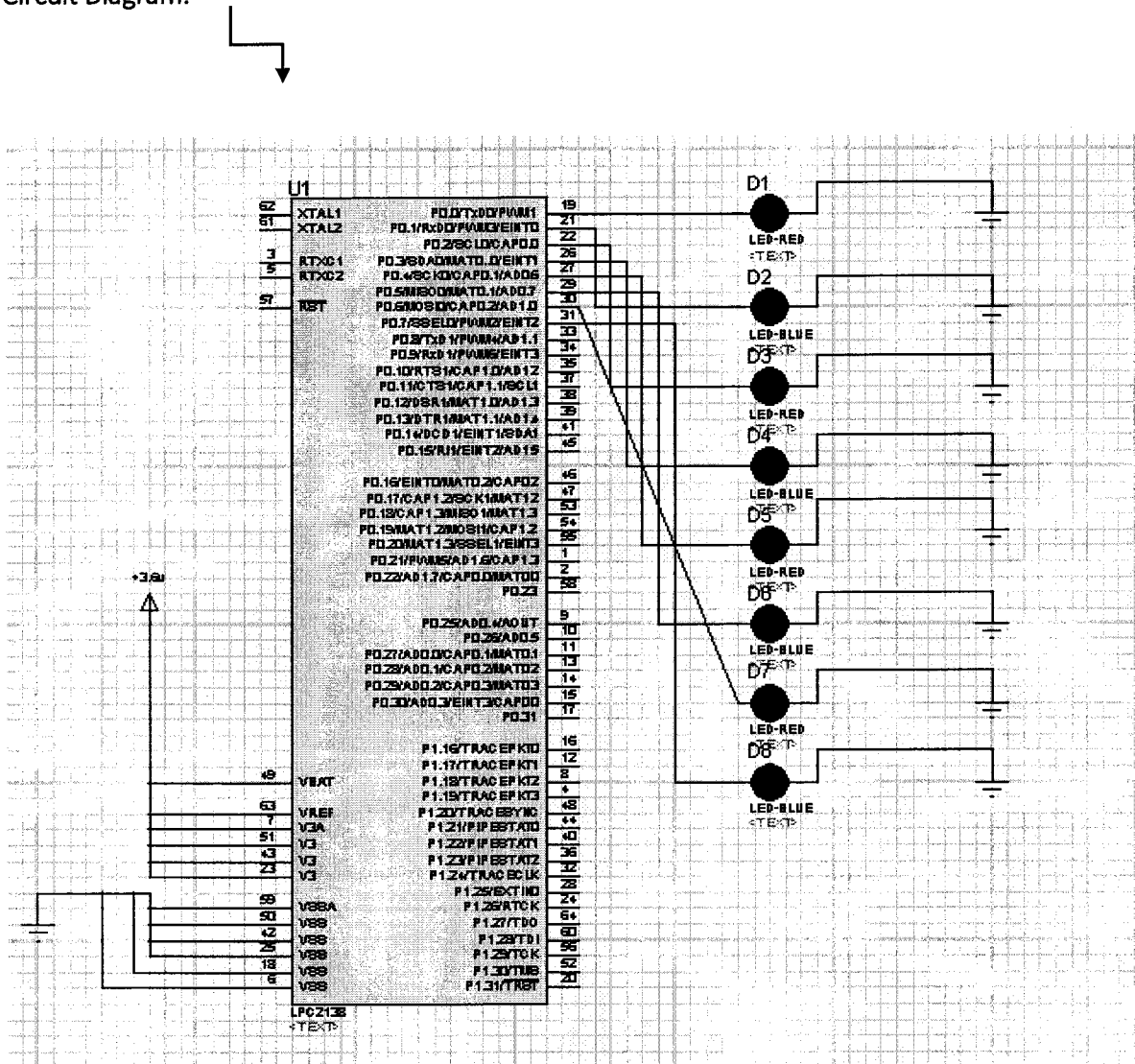
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EXPERIMENT-06

Aim: Write ARM code for LPC 2138 IC to blink a series of LED'S in forward and reverse direction

Requirements: LPC 2138 IC, Led's, jumper wires, resistance, 3.0 v power supply, Bread board

Circuit Diagram:



Example Code: →

```
#include <LPC213X.H>
void delay ()
{
```

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```
unsigned long int i;
for (i=0; i<=300000;i++)
{
    For (i=0; i<=300000;i++);
    {
    }
}
}
int main()
{
    int i,a,b;
    IODIRO=0XFF;
    While (1)
    {
        IOCLR0=0XFF;

        a=0X01;
        delay ();
        for (i=0;i<=7;i++)
        {
            IOSET0 = a;
            a=a<<1;
            delay ();
        }
        b=0X80;
        delay ();
        for (i=0;i<=7;i++)
        {
            IOCLR0 = (b);
            b=b>>1;
            delay ();
        }
    }
}
```

Observations →

WJ



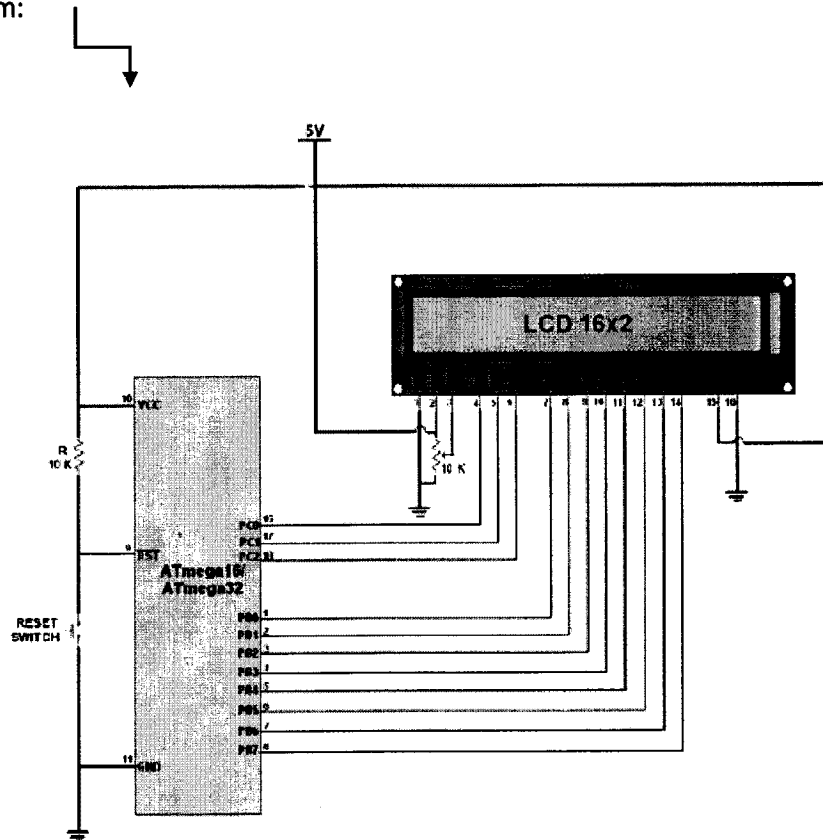
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EXPERIMENT-07

Aim: Write a ARM 7 program to show a message on LCD Display.

Requirements: AVR/ARM/PIC, USB programmer, LCD display, jumper wires, 5v power supply

Circuit Diagram:



Example Code: ➔

```
#include<avr/io.h>
#include<util/delay.h>
#include<string.h>
#define RS PC0
#define EN PC1
Void CMD_WRT ()
{
    PORTB=val;
    PORTC= PORTC & (~1(1<<RS));
    _delay_ms(1);
    PORTC=PORTC| ((1<<EN))
    _delay_ms(1);
    PORTC =PORTC & (~1(1<<EN))
}
Void DATA_WRT()
```



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```
{
    PORTB=ch;
    PORTC=PORTC|((1<<RS));
    _delay_ms(1);
    PORTC=PORTC|((1<<EN));
    _delay_ms(1);
    PORTC=PORTC & (~(1<<EN));
}
Void LCD_WRT()
{
    while(*string)
        DATA_WRT(*string++);
}

Int main(void){
    Unsigned char CMD[]={0*38,0*01,0*0f,0*06,0*80},TEMP1,i;
    DDRB=0*FF;
    DDRC=0*FF;
    _delay_ms(10);
    for(i=0;i<5;i++)
    {
        TEMP1=CMD[i];
        CMD_WRT(TEMP);
    }
    while(1)
    {
        CMD_WRT(0*01);
        CMD_WRT(0*80);
        LCD_WRT("Hello");
        CMD_WRT(0*C0);
        LCD_WRT("HELLOO");
        __delay_ms(1000);
        return 0;
    }
}
```

Observations →

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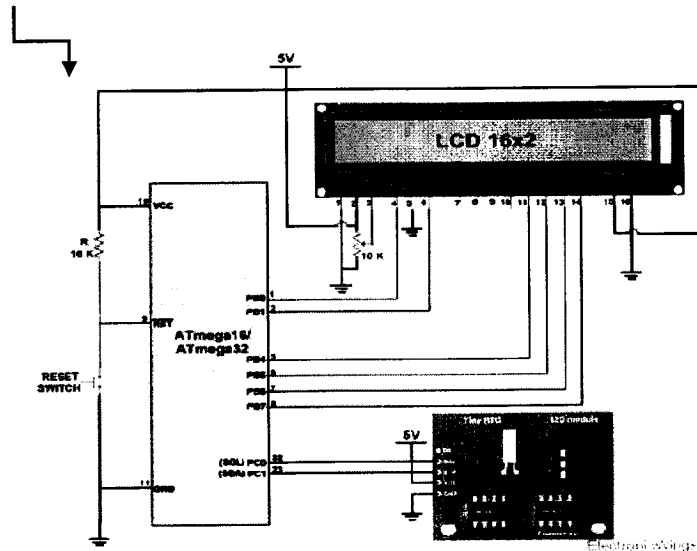
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EXPERIMENT U8

Aim: Write a ARM 7 program to show current time on LCD using RTC module.

Requirements: AVR/PIC/ARM, USB Programmer (CH340/FT232/CP2102), RTC DS 1307

Circuit Diagram:



Example code →

```
#include <avr/io.h>
#include <stdio.h>
#include <string.h>
#include <stdbool.h>
#include "I2C_Master_H_file.h"
#include "LCD16x2_4Bit.h"
#define Device_Write_address 0xD0 /* Define RTC DS1307 slave write address */
#define Device_Read_address 0xD1 /* Make LSB bit high of slave address for read */
#define TimeFormat12 0x40 /* Define 12 hour format */
#define AMPM 0x20
int second,minute,hour,day,date,month,year;
bool IsItPM(char hour_)
{
    if (hour_ & (AMPM))
        return 1 ;
    else
        return 0 ;
}
void RTC_Read_Clock(char read_clock_address)
{
    I2C_Start(Device_Write_address);
    I2C_Write(read_clock_address);
    I2C_Repeated_Start(Device_Read_address);
```

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```
second = I2C_Read_Ack();
minute = I2C_Read_Ack();
hour = I2C_Read_Nack();
I2C_Stop(); }
void RTC_Read_Calendar(char read_calendar_address)
{
I2C_Start(Device_Write_address);
I2C_Write(read_calendar_address);
I2C_Repeated_Start(Device_Read_address);
day = I2C_Read_Ack();
date = I2C_Read_Ack();
month = I2C_Read_Ack();
year = I2C_Read_Nack();
I2C_Stop(); }
int main(void)
{
char buffer[ 20 ];
char * days[ 7 ]= { "Sun" , "Mon" , "Tue" , "Wed" , "Thu" , "Fri" , "Sat" };
I2C_Init();
lcdinit();
while ( 1 )
{
RTC_Read_Clock( 0 );
if (hour & TimeFormat12)
{
printf (buffer, "%02x :%02x:%02x ", (hour & 0b00011111) ,
minute, second);
if (IsItPM(hour))
strcat (buffer, "PM" );
else
strcat (buffer, "AM" );
lcd_print_xy( 0 , 0 ,buffer);
}
else
{
printf( buffer, " %02x:%02x:%02x ", (hour & 0b00011111) ,
minute, second);
lcd_print_xy( 0 , 0 ,buffer);
}
RTC_Read_Calendar( 3 );
printf (buffer, "%02x /%02x/%02x %3s ", date, month,
year,days[day -1 ]);
lcd_print_xy( 1 , 0 ,buffer);
}}

```

Observations ➔

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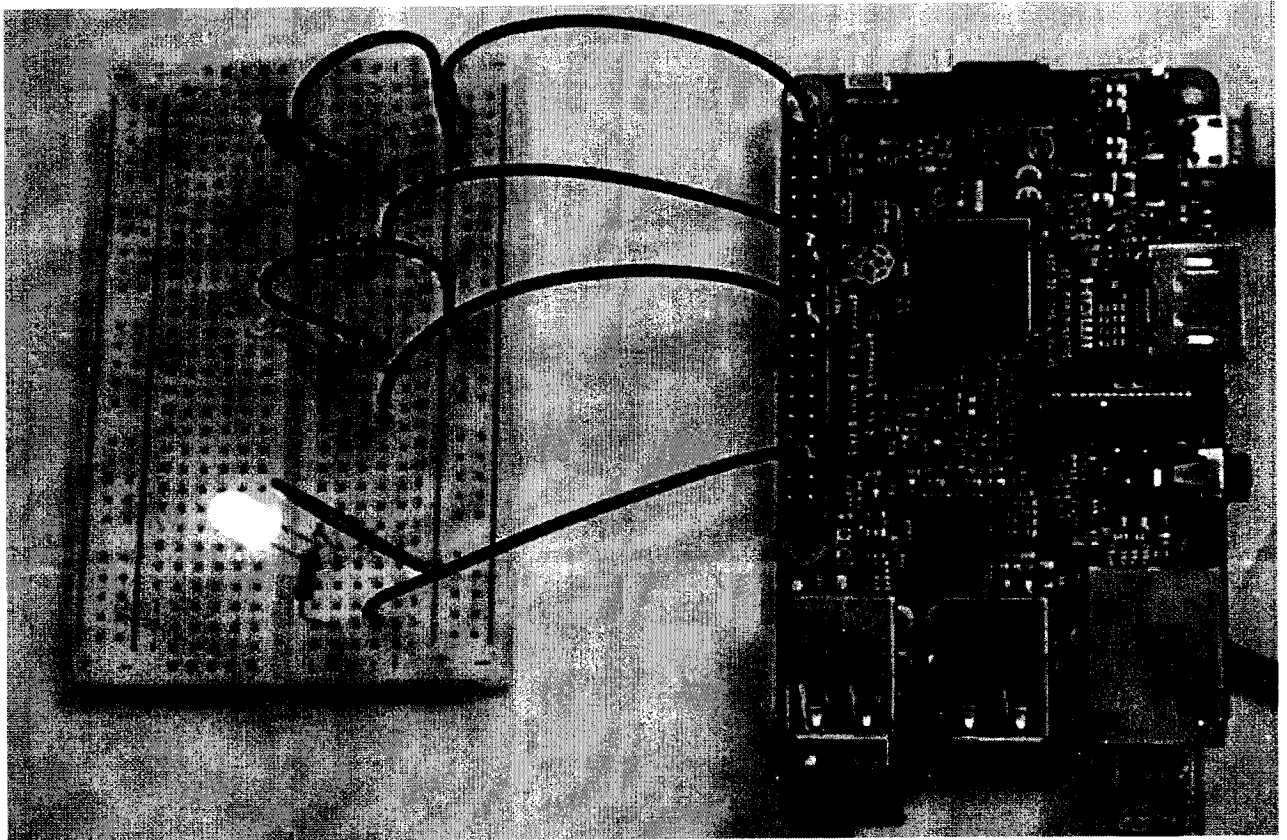
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EXPERIMENT-09

Aim: Write a program using Raspberry pi to implement Traffic light System.

Requirements: Raspberry Module, Bread Board, led's, Resistance's, jumper Wires, 5v power supply

Circuit Diagram:



Example Code: →

```
#Red, yellow, green light control, time based changes  
#uses G, Y, R sequence like US  
#Turns pins 7,11, & 13 on and off at 3.3v. I used pin 6 as ground
```

```
Import RPi.GPIO as GPIO  
Import time
```



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```
# on/off functions
def Liteon (pin,tiim):          ##Define Turn "pin" on function
    GPIO.output(pin,GPIO.HIGH) ##on "tiim" sec
    Time.sleep(tiim)
def Litroff(pin,tiim):        ##Define Turn "pin" off function
    GPIO.output(pin,GPIO.LOW)  ##off "tiim" sec
    Time.sleep(tiim)
    Return
# set up GPIO output channel
GPIO.setup(7, GPIO. OUT)
GPIO.setup(11, GPIO. OUT)
GPIO.setup(13, GPIO. OUT)

#blink GPIO07 5 times. Green pin 7, yellow pin 11, red pin 13
For I in range (0,5):
    Liteon(7,2)
    Liteoff(7,.1)
    Liteon(11,2)
    Liteoff(11,.1)
    Liteon(13,2)
    Liteoff(13,.1)
Print ("Done")
GPIO.cleanup()
```

Observations →

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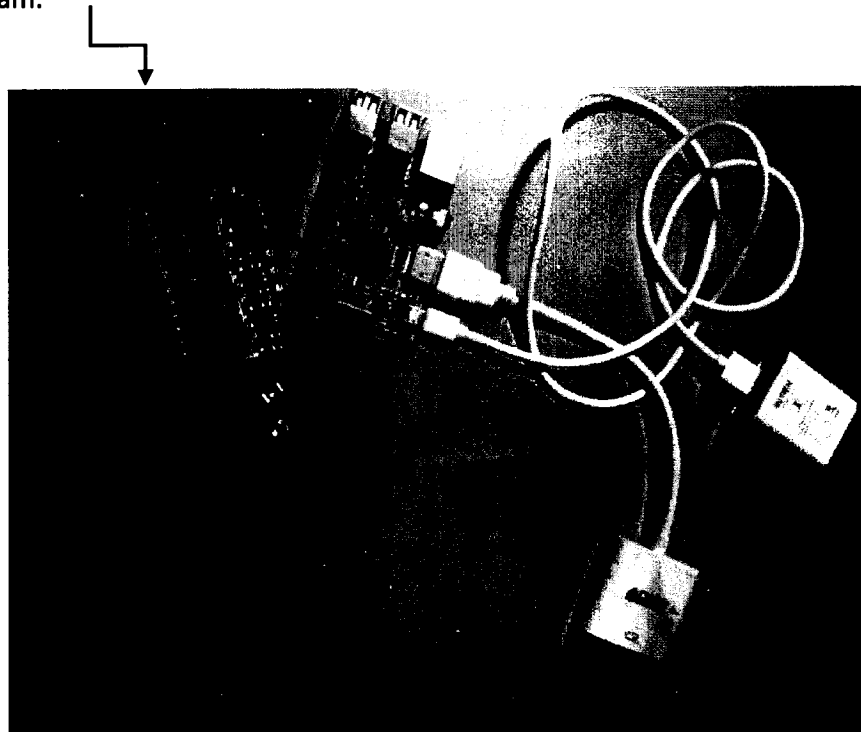
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EXPERIMENT-10

Aim: Write a program to control remote peripherals motor using email Server.

Requirements: Raspberry Module, Relay, Motor, Battery

Circuit Diagram:



Example code ►

```
import os
import smtplib
import imaplib
from email.message import EmailMessage
import email
import pprint
import time
import requests
from time import sleep
import RPi.GPIO as GPIO
EMAIL_USERNAME='sjay.mits@gmail.com'
EMAIL_PASSWORD='king@123$'
motor=21
GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)
```

VAI



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```
GPIO.setup(motor,GPIO.OUT)
```

```
def deleteEmailIMAP(mail,uuid):
    #mail.uid('STORE', uuid,'+FLAGS','(\Deleted)')
    mail.uid('STORE', uuid,'+X-GM-LABELS','(\Trash)')
    print(mail.expunge())
    msg= EmailMessage()

mail= imaplib.IMAP4_SSL('imap.gmail.com',993)
mail.login(EMAIL_USERNAME,EMAIL_PASSWORD)
mail.select('inbox')
# type,data = imap.search(None,'ALL')
# mail_ids = data[0]
# id_list = mail_ids.split()
# latest_email_id=id_list[-1]
# first_mail_id=int(id_list[0])
subject='motorON'
email_id_processed=0
motorStatus='Motor is Stopped....'
while True:
    print(motorStatus)
    time.sleep(5)
    result,data = mail.uid('search', None,'ALL')
    latest_email_id=data[0].split()[-1]
    # tmp , data =imap.fetch(latest_email_id ,'(RFC822)')
    tmp , data =mail.uid('fetch',latest_email_id ,'(RFC822)')
    raw_email=data[0][1]
    email_message=email.message_from_bytes(raw_email)
    #print(email_message['From'])
    #print(email_message['Subject'])
    if latest_email_id != email_id_processed:
        email_id_processed=latest_email_id
        if email_message['Subject']== 'motorON':
            print('Motor Run Command is Received....')
            deleteEmailIMAP(mail,latest_email_id)
            motorStatus='Motor is Runing....'
            GPIO.output(motor,1)
        elif email_message['Subject']== 'motorOFF':
            print('Motor Stop command is Received....')
            deleteEmailIMAP(mail,latest_email_id)
            GPIO.output(motor,0)
            motorStatus='Motor is Stopped....'
```

Observations →

Note- Need to install mobile app (IFTTT) and Google login (security-> less secure app access: on)



DEPARTMENT OF INFORMATION TECHNOLOGY

EXPERIMENT-11

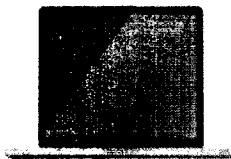
Aim: Control raspberry pi remotely Through SSH

Requirements: Raspberry Module, remote console, network (with internet connectivity)

Circuit Diagram:



Raspberry Pi



Raspberry Pi

Observations →

MA



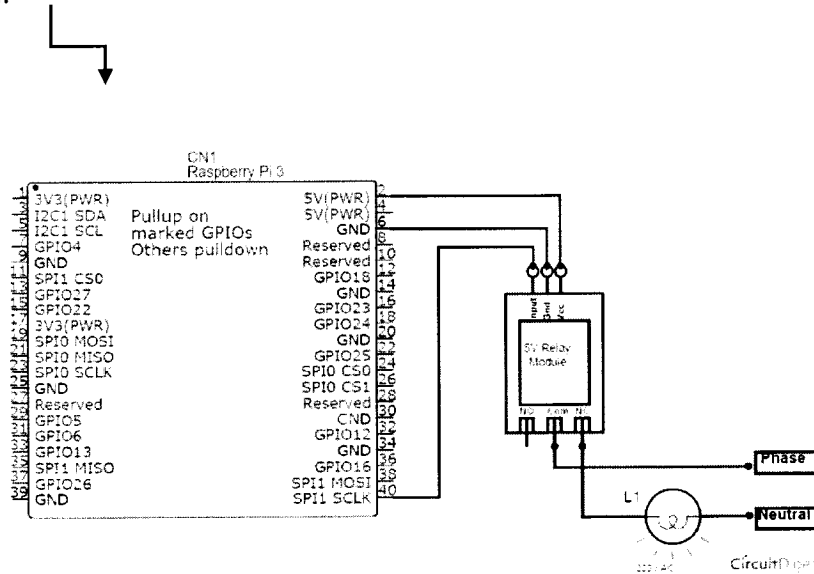
DEPARTMENT OF INFORMATION TECHNOLOGY

EXPERIMENT - 1

Aim: Write a program Using Raspberry-pi for Smart-Phone-Home-Automation

Requirements: Raspberry module, Relay, android (install app blue term), Led bulb, wire's, 220v power supply, 5v power supply

Circuit Diagram:



Example Code →

```
sudo apt-get update
sudo apt-get upgrade
sudo apt-get install bluetooth blueman bluez
```

Handwritten signature



DEPARTMENT OF INFORMATION TECHNOLOGY

```
sudo reboot
sudo apt-get install python-bluetooth
sudo apt-get install python-rpi.gpio
sudo bluetoothctl
```

```
[bluetooth]# power on
[bluetooth]# agent on
[bluetooth]# discoverable on
[bluetooth]# pairable on
[bluetooth]# scan on
```

```
pair <address of your phone
sudo apt-get install python-bluetooth
python /home/pi/Bluetooth_homeautomation
accepted connection from( fs:sf:sf:sf:sg:gf:,1)
import Bluetooth
```

```
server_socket=bluetooth.BluetoothSocket( bluetooth.RFCOMM )
port = 1
server_socket.bind(("",port))
server_socket.listen(1)
client_socket,address = server_socket.accept()
print "Accepted connection from ",address
while 1:
    data = client_socket.recv(1024)

client_socket.close()
server_socket.close()
```

Code

```
import bluetooth
import RPi.GPIO as GPIO #calling for header file which helps in using GPIOs of PI
BULB=21
```

```
GPIO.setmode(GPIO.BCM) #programming the GPIO by BCM pin numbers. (like PIN40 as
GPIO21)
GPIO.setwarnings(False)
GPIO.setup(BULB,GPIO.OUT) #initialize GPIO21 (Relay connected at this pin) as an output Pin
GPIO.output(BULB,0)
```

```
server_socket=bluetooth.BluetoothSocket( bluetooth.RFCOMM )
```

```
port = 1
server_socket.bind(("",port))
server_socket.listen(1)
```

WJ



DEPARTMENT OF INFORMATION TECHNOLOGY

```
client_socket,address = server_socket.accept()
print "Accepted connection from ",address
while 1:
    data = client_socket.recv(1024)
    print "Received: %s" % data
    if (data == "0"): #if '0' is sent from the Android App, turn OFF the CFL bulb
        print ("AC light OFF")
        GPIO.output(BULB,0)
    if (data == "1"): #if '1' is sent from the Android App, turn OFF the CFL bulb
        print ("AC light ON")
        GPIO.output(BULB,1)
    if (data == "q"):
        print ("Quit")
        break

client_socket.close()
server_socket.close()
```

Observations →

WA



DEPARTMENT OF INFORMATION TECHNOLOGY

EXPERIMENT-13

Aim: To check the sensor communication with node's and observes Data serially

Requirements: Node1...Node10 module, sensor's, Tablet pc, Internet

Theory: In this experiment we first check our sensor and calibrate it for the value which we want to see on app. So first we check the sensor serially.

Procedure:



1. Let us suppose we have PIR Sensor, so first place the sensor in connector one of node.
2. And burn the code in controller using Arduino software, take digital 2 pin for PIR sensor Reading.
3. As Sensor, gives a reading in high or low , so just digital read (2) and display it Serially on PC
4. If there is metal in front of PIR, It gives a high signal and display "HIGH" Serially and in case of low signal, it display "LOW".
5. Burn the code through USB through connector which is in between of connector1 and connector2.

Observations →

2/1



DEPARTMENT OF INFORMATION TECHNOLOGY

EXPERIMENT-14

Aim: To check the data on recorded MQTT Cloud Server.

Requirements: Node1...Node10 module, sensor, Internet

Theory: In this experiment we will check the data on cloud.

Procedure:



1. First burn the IOT_Sensor_interfacing_node.ino file code in node 1
2. Then open the chrome , open this link" <https://www.cloudmqtt.com/>"

← 🔍 🏠 🔒 Secure | https://www.cloudmqtt.com

CloudMQTT Pricing Documentation Support Blog Login

Hosted message broker for the Internet of Things

Perfectly configured and optimized message queues for IoT, ready in seconds.

Press the login button

Handwritten signature



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CloudMQTT

Log in

prajapati.diksha1709@gmail.com

Remember me

Forgot your password?

Log in

Create an account

Create

Authenticate through a third-party service

Sign in with GitHub

Sign in with Google

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Pricing Policies

Program Policy

Security Policy

Imprint

Low Disk Space

You are running out of disk space on Local Disk (F:). Click here to see if you can free space on this drive.

Windows Explorer

3. User id: diksha.atechindia@gmail.com

Password: advance@20

CloudMQTT

List all instances

prajapati.diksha1709@gmail.com

Instances

Name	Plan	Datacenter	Actions
MQTT Test	Get	Amazon Web Services EU-West-1 (Ireland)	Edit

Click here

MENU

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MORE

Status

Terms of Service

Program Policy

Privacy Policy

Security Policy

Imprint

CloudMQTT

Contact Support

CloudMQTT

WJ



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Click here on WEBSOCKET UI

Instance info

Server	m23.cloudmqtt.com	
User	jwyg99z	<input type="button" value="Reset"/>
Password	PROWECU6T0h	<input type="button" value="Reset"/>
Port	15614	
SSL Port	25614	
Websockets Port (TLS only)	35614	
Connection limit	10	

Active Plan

Cute Cat

Reset DB

Websocket

Send message

Topic: _____
Message: _____

Received messages

Topic	Message
✓ Connected!	
ⓘ Connecting to m23.cloudmqtt.com...	

You can see data here

Clear any data for a client id

Client ID: _____

Observations →



DEPARTMENT OF INFORMATION TECHNOLOGY

EXPERIMENT-15

Aim: To change the Wi-Fi SSID and Password of ESP8266 Wi-Fi module.

Requirements: Arduino software, ESP 8266 , USB cable

Theory: in this experiment we change the SSID and Password as per your wifi SSID and Password.

Procedure:



1. Open the IOT_Sensor_interfacing_nodex, here x is 1,2,3.....10.

 IOT_Sensor_interfacing_node1 | Arduino 1.8.5

File Edit Sketch Tools Help



```
#include <SoftwareSerial.h>
#include <Wire.h> // SCL-SCL(analog pin-5)
//SDA-SDA(analog pin-4)
#include <math.h>
#include "DHT.h"
#define DHTPIN 3
#define DHTTYPE DHT22 // DHT 22 (AM2302), AM2321

const int BAIpin=A3;
const int MQpin = A2;
const int CO2pin = A0;
const int trigUS = 3;
const int echoUS = 7;
const int PIR_Sens = 2;
const int Broxi = 4;

int i;
int pirState = LOW;
int value;
int duration;
int distance;
int val = 0;
byte buff[2];
int f1=0,f2=0,f3=0,f4=0,f5=0,f6=0,f7=0,f8=0;

String ssid="taran bir singh";
String password="t@r@n9468803446";

SoftwareSerial mySerial(8, 9); //TX,RX
```

In code here we have to change the SSID and Password



2. Then save the code and burn into the node through USB.

Observations →

WF



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ANNEXURE - X

*List
of
Experiments and Skill Based Mini Project
for
Laboratory Courses
B.Tech III Semester
(Batches admitted in 2020-21)
(Information Technology/Artificial
Intelligence and Robotics/ Internet of
Things(IoT))
Under Flexible Curriculum
[ITEM 9]*



DESIGN & ANALYSIS OF ALGORITHMS
(160312/230301/240301)

LIST OF PROGRAMS

1. WAP to implement the following using array as data structure and analyze its time complexity.
a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort e. Merge sort
f. Bucket sort g. Shell sort h. Radix sort i. Heap sort
 2. WAP to implement Linear and Binary Search and analyze its time complexity.
 3. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
 4. WAP to implement Longest Common Subsequence Problem and analyze its time complexity.
 5. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
 6. WAP to implement Huffman Coding and analyze its time complexity.
 7. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
 8. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
 9. WAP to implement DFS and BFS and analyze their time complexities.
 10. WAP to Implement 0/1 knapsack using dynamic programming.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. relate the principles of algorithm design in solving problems.
 - CO2. demonstrate basic algorithms and different problem solving strategies.
 - CO3. build creativeness and confidence to solve non-conventional problems.
 - CO4. analyze running times of algorithms using asymptotic analysis.
 - CO5. compare various algorithm design approaches for solving real world problems.
 - CO6. design and implement optimization algorithms in specific applications.
-

NA



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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
(160312/230301/240301)

LIST OF SKILL BASED MINI PROJECT

1. Implement tree traversal techniques like pre-order, post-order and in-order.
 2. Implementation of divide and conquer based merge sort algorithm, quick sort algorithm.
 3. Implementation of divide and conquer based matrix multiplication algorithm.
 4. Implement the greedy approach for single source shortest path.
 5. Design a program for finding minimum cost tree for traversing all nodes of a graph.
 6. Implement the Knapsack problem and 0/1 Knapsack problem.
 7. Implement the travelling salesman problem using dynamic programming.
 8. Implement matrix chain multiplication using dynamic programming.
 9. Design a program for 4 and 8 queen problem.
 10. Implement a program for polynomial reduction.
-

WA



DATABASE MANAGEMENT SYSTEM
(160313/ 230304/240304)

LIST OF PROGRAMS

While creating tables, databases the name should have a prefix of your roll number.

Ex. If your roll number is 55 then every table name must start with 55 TABLE_NAME. 1. Write program name 2. Write description of command used for executing the query. 3. Write commands in bold letters. 4. Take the screenshot of the output.

1. Implementation of DDL commands of SQL with suitable examples.
 - a. Create table
 - b. Alter table
 - c. Drop Table
2. Implementation of DML commands of SQL with examples.
 - a. Insert
 - b. Update
 - c. Delete
3. Implementation of different type of function with suitable example
 - a. Number function
 - b. Aggregate function
 - c. Character function
 - d. Conversion function
 - e. Data function
4. Implementation of different type of operators in SQL.
 - a. Arithmetic operators
 - b. Logical operators
 - c. Set operator
 - f. Comparison Operator
 - g. Special operator
5. Implementation of type of joins.
 - a. Inner Join
 - b. Outer Join
 - c. Natural Join etc.
6. Study and implementation of
 - a. Group by & having clause
 - b. order By clause
 - c. Indexing
7. Study of Implementation of
 - a. Sub queries
 - b. Views
8. Study & implementation of different type of constraints.
9. Study & implementation of database backup & recovery command. Study & implementation of Rollback, commit, savepoint.
10. Creating Database /Table Space

ML



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- a. Managing Users: Create User, Delete User
- b. Managing roles: Grant, Revoke.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. construct database schema for a given problem domain.
 - CO2. apply integrity constraints on a database schema using a state-of-the-art RDBMS.
 - CO3. apply SQL queries using DDL and DML to design and access database systems
 - CO4. make use of operators and functions used in query.
 - CO5. distinguish Tables and Views for database systems.
 - CO6. develop a small project for a real world scenario.
-

MA



DATABASE MANAGEMENT SYSTEM
(160313/ 230304/240304)

LIST OF SKILL BASED MINI PROJECT

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Design ER-Diagram, Create Schema and insert at least 5 records for each table. Add appropriate database constraints

Mini Skill Project 1

Consider the following schema for a Library Database:

BOOK (Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS (Book_id, Author_Name)

PUBLISHER (Name, Address, Phone)

BOOK_COPIES (Book_id, Programme_id, No-of_Copies)

BOOK_LENDING (Book_id, Programme_id, Card_No, Date_Out, Due_Date)

LIBRARY_PROGRAMME (Programme_id, Programme_Name, Address)

Write SQL queries to

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

Mini Skill Project 2

Consider the following schema for Order Database:

SALESMAN (Salesman_id, Name, City, Commission)

CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id)

ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)

Write SQL queries to

1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesman who had more than one customer.
3. List all the salesman and indicate those who have and do not have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the customer with the highest order of a day.
5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

NAI



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Mini Skill Project 3

Consider the schema for Movie Database:

ACTOR (Act_id, Act_Name, Act_Gender)

DIRECTOR (Dir_id, Dir_Name, Dir_Phone)

MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)

MOVIE_CAST (Act_id, Mov_id, Role)

RATING (Mov_id, Rev_Stars)

Write SQL queries to

1. List the titles of all movies directed by 'Hitchcock'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. Update rating of all movies directed by 'Steven Spielberg' to 5.

Mini Skill Project 4

Consider the schema for College Database:

STUDENT (USN, SName, Address, Phone, Gender)

SEMSEC (SSID, Sem, Sec)

CLASS (USN, SSID)

COURSE (Subcode, Title, Sem, Credits)

IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write SQL queries to

1. List all the student details studying in fourth semester 'C' section.
2. Compute the total number of male and female students in each semester and in each section.
3. Create a view of Test1 marks of student USN '1BI15CS101' in all Courses.
4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
5. Categorize students based on the following criterion:
If FinalIA = 17 to 20 then CAT = 'Outstanding'
If FinalIA = 12 to 16 then CAT = 'Average'
If FinalIA < 12 then CAT = 'Weak'
Give these details only for 8th semester A, B, and C section students.

Mini Skill Project 5

Consider the schema for Company Database:

EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)

DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)

DLOCATION (DNo, DLoc)

PROJECT (PNo, PName, PLocation, DNo)

WORKS_ON (SSN, PNo, Hours)

Write SQL queries to

WA



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1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.
3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

Mini Skill Project 6

A university registrar's office maintains data about the following entities:

- (a) courses, including number, title, credits, syllabus, and prerequisites;
- (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
- (c) students, including student-id, name, and program; and
- (d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

Mini Skill Project 7

Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.

Mini Skill Project 8

Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

Mini Skill Project 9

Design an E-R diagram for keeping track of the exploits of your favourite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.

Mini Skill Project 10

Consider a database used to record the marks that students get in different exams of different course offerings.

- a. Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for the above database.
- b. Construct an alternative E-R diagram that uses only a binary relationship between students and course-offerings. Make sure that only one relationship exists between a particular student and course-offering pair, yet you can represent the marks that a student gets in different exams of a course offering.

NA



JAVA PROGRAMMING LAB
(160315)

LIST OF PROGRAMS

1. Write a program to accept two numbers (int) as command line arguments and print their Sum.
2. Write a program to print Fibonacci series without using recursion and using recursion.
3. Write a program to check prime numbers and palindrome numbers.
4. Write a program to sort an array of elements using bubble sort algorithm.
5. Write a program to sort an array of elements using insertion sort algorithm.
6. Write a non-static function in java that prints the sum of two numbers.
7. Create an abstract class Shape which has a field PI=3.14 as final and it has an abstract method Volume. Make two subclasses Cone and Sphere from this class and they print their volume.
8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
9. Develop an Applet that receives an integer in one text field & compute its factorial value & returns it in another text field when the button "Compute" is clicked
10. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every first second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the available features in Java programming language.
 - CO2. illustrate Java programming concepts for solving problems.
 - CO3. make use of the Java programming methods for connecting the various databases.
 - CO4. test for bugs in a software application written in the Java programming language.
 - CO5. determine different ways for handling exceptions, memory management, file handling, i/o management and internet based application development.
 - CO6. build a project for application development using Java programming language.
-

MA



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JAVA PROGRAMMING LAB
(160315)

LIST OF SKILL BASED MINI PROJECT

1. Design and implementation of Registration page for a system
 2. Design and implementation of User name- password page for a system
 3. Design and implementation of database connectivity using JDBC with SQL
 4. Design and implementation of database connectivity using JDBC with MS Access
 5. Update, deletion and search of items in a database using a web page/front end
 6. Display of Database table in a webpage
 7. Design of dynamic web pages with backward and forward functions
 8. Display of a video file in a web page
 9. Display of Graph Representation in a web page
 10. Email notification using Java Library
-

WA



DESIGN AND THINKING LAB
(230305)

LIST OF PROGRAMS

1. Introduction to Arduino Board and Arduino IDE (Installation and Setup)
2. Write a Program to Blink LED (Turn an LED on and off).
3. Write a Program to demonstrate the use of analog output to fade an LED.
4. Write a Program to read an analog input and prints the voltage to the serial monitor.
5. Write a Program to count the number of button pushes.
6. Write a Program to Control an LED using Button.
7. Write a program to detect object using IR Obstacle Sensor.
8. Write a program to detect presence of Gas using GAS Sensor.
9. Write a Program to Control Electronic Appliances using RELAY SHIELD Sensor.
10. Write a Program to measure Temperature and Humidity using DHT11 Sensor.
11. Write a program to detect motion using Motion Sensor (PIR sensor).
12. Write a Program to detect presence of smoke using Smoke Sensor.
13. Write a Program to play melody with a Piezo speaker.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: define the basic concept of Embedded System.
- CO2: describe the basic principles of Arduino programming and IDE.
- CO3: familiarize with different types of sensors and related systems.
- CO4: design, implement, debug and test programs/ system.
- CO5: design and develop Smart systems applications.
- CO6: build Arduino board using different sensors.

LIST OF SKILL BASED MINI PROJECT

1. Intelligent home locking system.
 2. Intelligent water level management system.
 3. Home automation using RFID.
 4. Real time clock-based home automation.
 5. Intelligent Automatic Irrigation System
-

VA



PYTHON PROGRAMMING LAB
(240305)

LIST OF PROGRAMS

1. WAP to swap two integers without using third variable. The swapping must be done in a different method in a different class.
2. WAP that uses a class where the member functions are defined outside a class.
3. WAP to find the greater of two given numbers in two different classes using friend function.
4. Create an abstract class Shape which has a field PI=3.14 as final and it has an abstract method Volume. Make two subclasses Cone and Sphere from this class and they print their volume.
5. Create a class called LIST with two pure virtual function store() and retrieve(). To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
6. WAP to define the function template for calculating the square of given numbers with different data types.
7. Design a class to represent a bank account. Which include contains account number, name of the depositor, type of the account, balance amount in the account. Define Methods, to assign initial values, to Deposit an amount, to Withdraw amount after checking balance, to display name and balance.
8. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.
9. Assume that you are working to develop a software in the industry. One feature of the software demands to take a string input from user and print number of lower-case characters, number of uppercase characters, number of digits, and number of special characters. Develop a python code that enables the above feature in the software.
10. In software industries, one of the key tasks is to read and understand the code for further enhancements/modification. Your manager in the industry asks to you identify the portion of the codes that delivers same output. Below are eight python codes for you to read, understand, and then you have to group them into four different groups/clusters based on the similarity of the outputs.

A:

```
A=[1, 10, 8, 7, 12, 14, 13, 18, 22]
i=0
while i < len(A):
    if A[i]%2==0:
        A.remove(A[i])
```

MA



DEPARTMENT OF INFORMATION TECHNOLOGY

```
else:  
i=i+1  
print(A)
```

B:

```
A=[1, 10, 8, 7, 12, 14, 13, 18, 22]  
i=0  
for i in A:  
if i%2==0:  
A.remove(i)  
print(A)
```

C:

```
a=[]  
for i in range(20):  
if(i%2 != 0):  
a.append(i)  
print(a)
```

D:

```
a=[]  
for i in range(0,20,2):  
a.append(i)  
print(a)  
E  
a=[i for i in range(1,20,2)]  
print(a)
```

F:

```
a=[i for i in range(20) if(i%2==0)]  
print(a)
```

G:

```
A=[1, 10, 8, 7, 12, 14, 13, 18, 22]  
i=0  
for i in A[:]:  
if i%2==0:  
A.remove(i)  
print(A)
```

H:

```
A=[1, 10, 8, 7, 12, 14, 13, 18, 22]  
i=0  
while i < len(A):  
if A[i]%2==0:  
A.remove(A[i])  
i=i+1  
print(A)
```

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11. WAP to raise an exception for any kind of error in the program.
-

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. solve computational problem using python language
 - CO2. familiar with basics syntax and features of python programming language
 - CO3. Hands on experience to online coding tools like colab.
 - CO4. design a program utilizing the features of object oriented concept.
 - CO5. Utilize some of the libraries available for solving problems.
-

WA



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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING LAB
(240305)

LIST OF SKILL BASED MINI PROJECT

1. Implement a calculator using Tkinter library.
 2. Design and implementation of Animal Kingdom Classification.
 3. Design and implementation of a real-time, User friendly Currency Converter.
 4. Design and implementation of a File Manager which supports various types of files.
 5. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
 6. Design any game of your choice like tic-tac-toe etc.
 7. Implement a contact book (command line project) capable of storing user data like name, address, phone number, email etc. Use any database for storing the information so that updation and deletion can also be carried out.
 8. Implement binary search algorithm by creating a list from random numbers between any predefined ranges.
 9. Design a program for spam filtering.
 10. Design a dice rolling simulator generating random number from 1 to 6 every time dice is rolled.
 11. Implement countdown clock and timer.
-

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*List
of
Experiments and Skill Based Mini Project
for
Laboratory Courses
B.Tech IV Semester
(Batches admitted in 2020-21)
(Information Technology/Artificial
Intelligence and Robotics/ Internet of
Things(IoT))
Under Flexible Curriculum*



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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER GRAPHICS & MULTIMEDIA
(160411)

LIST OF PROGRAMS

1. WAP to implement line generation using DDA algorithm.
 2. WAP to implement line generation using Bresenham's line generation algorithm.
 3. WAP to generate a circle using mid-point algorithm.
 4. WAP to perform translation, rotation, scaling on 2D transformation.
 6. WAP to implement translation of a line and triangle.
 7. WAP to implement rotation of a line and triangle.
 8. WAP to implement scaling transformation.
 9. WAP to fill polygon using seed filling algorithm.
 10. WAP to implement 3D rotation about an arbitrary axis.
 11. WAP to implement Cohen Sutherland line clipping.
-

COURSE OUTCOMES

After completion of the course students will be able to:

- CO1. understand the basic concepts of computer graphics.
 - CO2. to learn Programming User-interface issues related to graphics.
 - CO3. design scan conversion problems using C & C++ programming.
 - CO4. implement the concepts of different type of geometric transformation of objects 2D & 3D.
 - CO5. apply clipping and filling techniques for modifying an object.
 - CO6. understand the practical implementation of modeling, rendering, viewing of objects in 2D.
-

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER GRAPHICS & MULTIMEDIA
(160411)

LIST OF SKILL BASED MINI PROJECT

1. Flag design project
 2. Pyramid of Stars Project
 3. House front face Project
 4. Balloon Project
 5. Smile face Project
 6. Rain project
 7. Football project
 8. Moving a wheel project
 9. Moving a Cycle project
 10. 3D Laptop Image Project
 11. Digital Clock Project
 12. Analog Clock Project
 13. Calculator Project
-

WA



COMPUTER ARCHITECTURE AND MICROPROCESSOR
(230401/240401)

LIST OF EXPERIMENT

1. Write an assembly language program to perform the subtraction of two 8-bit number using 8085/8086 instruction set.
2. Write an assembly language program to move data block starting at location 'X' to location 'Y' without overlap using 8085/8086 instruction set.
3. Write an assembly language program to move data block starting at location 'X' to location 'Y' with overlap using 8085/8086 instruction set.
4. Write an assembly language program to arrange set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address data field using 8085/8086 instruction set.
5. Write an assembly language program to perform the multiplication of two 8-bit numbers using 8085/8086 instruction set.
6. Write an assembly language program to perform the division of two 8-bit numbers using 8085/8086 instruction set.
7. Write an assembly language program to find the larger number in array of data using 8085/8086 instruction set.
8. Write an assembly language program to convert two BCD numbers in memory of the equivalent HEX number using 8085/8086 instruction set.
9. Write an assembly language program to convert given hexadecimal number into its equivalent BCD number using 8085/8086 instruction set.
10. Write an assembly language program to convert given hexadecimal number into its equivalent ASCII number using 8085/8086 instruction set.
11. Write an assembly language program to convert given ASCII character into its equivalent hexadecimal number using 8085/8086 instruction set.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain types of instructions and addressing modes.
 - CO2. make use of Hex code needed in assembly language
 - CO3. experiment with various peripheral devices to interface with microprocessors.
 - CO4. simplify the arithmetic, Logical, etc. problems using the instruction set of 8086/8085 microprocessors.
 - CO5. determine the process required in interfacing with 8086/8085.
 - CO6. develop the assembly language programs in 8086/8085 to solve a real world problem.
-

MS



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DEPARTMENT OF INFORMATION TECHNOLOGY

MICROPROCESSOR AND COMPUTER ARCHITECTURE
(230401/240401)

LIST OF SKILL BASED MINI PROJECT

1. Temperature Controller using microprocessor 8085 or 8086
 2. Traffic light controller using 8086 microprocessor
 3. Night light saver using 8086 microprocessor
 4. Interfacing with Stepper Motor controller
 5. Interfacing with DC motor controller
 6. Interfacing with Switchers
 7. Interfacing with keypad
 8. Interfacing with LED's
 9. Interfacing with switches
 10. Interfacing with ADC
-

MA



SOFTWARE ENGINEERING LAB
(160412/230403/240403)

LIST OF EXPERIMENTS

Experiment 1: Identify the requirements from problem statements

Requirements, Characteristics of Requirements, Categorization of Requirements, Functional Requirements, Identifying Functional Requirements

Experiment 2: Estimation of project metrics using estimation techniques like COCOMO model

Project Estimation Techniques, COCOMO, Basic COCOMO Model, Intermediate COCOMO Model, Complete COCOMO Model, Advantages of COCOMO, Drawbacks of COCOMO, Halstead's Complexity Metrics

Experiment 3: Modeling UML Use Case diagrams and capturing Use Case Scenarios

Use case diagrams, Actor, Use Case, Subject, Graphical Representation, Association between Actors and Use Cases, Use Case Relationships, Include Relationship, Extend Relationship, Generalization Relationship, Identifying Actors, Identifying Use cases, Guidelines for drawing Use Case diagrams

Experiment 4: E-R modeling from the problem statements

Entity Relationship Model, Entity Set and Relationship Set, Attributes of Entity, Keys, Weak Entity, Entity Generalization and Specialization, Mapping Cardinalities, ER Diagram, Graphical Notations for ER Diagram, Importance of ER modeling

Experiment 5: Modeling UML Class diagrams and Sequence diagrams

Structural and Behavioral aspects, Class diagram, Elements in class diagram, Class, Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages

Experiment 6: Modeling Data Flow diagrams

Data Flow Diagram, Graphical notations for Data Flow Diagram, Explanation of Symbols used in DFD, Context diagram and leveling DFD

Experiment 7: Create flow chart for an algorithm using Raptor

Assignment, Call, Input, Output, Selection and Loop symbols.

Experiment 8: Estimation of Test coverage metrics and structural complexity

Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits.

Experiment 9: Designing Test Suites

Software Testing, Standards for Software Test Documentation, Testing Frameworks, Need for Software Testing, Test Cases and Test Suite, Types of Software Testing, Unit Testing, Integration Testing, System Testing, Example, Some Remarks.



RECOMMENDED TOOLS

- Selenium
- Star UML
- UMLet
- Raptor

REFERENCE

- Virtual Labs (<http://vlabs.iitkgp.ernet.in/se/>)

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: demonstrate the basic concept of UML.
 - CO2: discuss the software development process using different tools.
 - CO3: display the various ways for solving different common modelling problems using UML.
 - CO4: use the knowledge of Software engineering and project management.
 - CO5: identify the vocabulary, rules and idioms of the UML and learn how to model it effectively.
 - CO6: design the software systems using software engineering concepts.
-

MA



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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE ENGINEERING LAB
(160412/230403/240403)

LIST OF SKILL BASED MINI PROJECT

1. Study of requirements gathering techniques
 2. Installation and study of JUnit software for Unit testing
 3. Write test cases using JUnit software
 4. Installation and study of StarUML software for UML diagrams designing
 5. Generation of class diagram using StarUML for Health Management System
 6. Generation of State diagram using StarUML for Health Management System
 7. Generation of Object diagram using StarUML for Health Management System
 8. Installation and study of Selenium Software for GUI testing
 9. Write test cases for a webpage using Selenium Software
 10. Study of Debugging of program
-

ML



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DEPARTMENT OF INFORMATION TECHNOLOGY

MACHINE LEARNING AND OPTIMIZATION
(240404)

LIST OF PROGRAMS

1. Implementation of linear regression using any of the tool or language like XLminer, matlab, R or python over the wine quality dataset available on UCI repository.
2. Implement Logistic regression model.
3. Implement the decision tree algorithms like ID3 etc. over any dataset from Kaggle or UCI repository.
4. Implement random forest over the physionet challenge 2012 dataset for mortality prediction.
5. Implement K-nearest neighbours' algorithm over the dataset from Kaggle or any other repository.
6. Implement the K-means partitioning clustering algorithm.
7. Implement the simple AND, OR and EX-OR gate using neural networks.
8. Implement the classification over any dataset using ANN.
9. Use bagging, boosting approach to improve the performance of your algorithm over any dataset from trusted repository.
10. Use the libraries in python for assessing and visualizing the performance of classification algorithm.

WA



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DEPARTMENT OF INFORMATION TECHNOLOGY

MACHINE LEARNING AND OPTIMIZATION
(240404)

LIST OF SKILL BASED MINI PROJECT

1. Design and implement heart disease prediction using different classification algorithm and analyse the best over the dataset.
 2. Design and implementation of Animal Kingdom Classification using CNN with the help of available libraries in python.
 3. Apply the classification algorithms over the time series dataset by transforming the dataset into static values.
 4. With the help of Support vector machine algorithm classify any suitable dataset available over the trusted repository.
 5. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
 6. Design the game of tic-tac-toe etc.
 7. Optimize the performance of your classification algorithm using the applicable optimization algorithm like swarm based, genetic algorithm.
 8. Compare the performance of different algorithms over physionet challenge 2012 dataset.
 9. Implement an algorithm for Parkinson disease detection and validate its performance with cross-validation approach.
 10. Implement a movie recommendation system using any algorithm over the dataset from trusted repository.
-



PYTHON PROGRAMMING LAB
(230406)

LIST OF PROGRAMS

1. WAP to swap two integers without using third variable. The swapping must be done in a different method in a different class.
2. WAP that uses a class where the member functions are defined outside a class.
3. WAP to find the greater of two given numbers in two different classes using friend function.
4. Create an abstract class Shape which has a field PI=3.14 as final and it has an abstract method Volume. Make two subclasses Cone and Sphere from this class and they print their volume.
5. Create a class called LIST with two pure virtual function store() and retrieve(). To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
6. WAP to define the function template for calculating the square of given numbers with different data types.
7. Design a class to represent a bank account. Which include contains account number, name of the depositor, type of the account, balance amount in the account. Define Methods, to assign initial values, to Deposit an amount, to Withdraw amount after checking balance, to display name and balance.
8. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.
9. Assume that you are working to develop a software in the industry. One feature of the software demands to take a string input from user and print number of lower-case characters, number of uppercase characters, number of digits, and number of special characters. Develop a python code that enables the above feature in the software.
10. In software industries, one of the key tasks is to read and understand the code for further enhancements/modification. Your manager in the industry asks to you identify the portion of the codes that delivers same output. Below are eight python codes for you to read, understand, and then you have to group them into four different groups/clusters based on the similarity of the outputs.

A:

```
A=[1, 10, 8, 7, 12, 14, 13, 18, 22]
i=0
while i < len(A):
    if A[i]%2==0:
        A.remove(A[i])
```



DEPARTMENT OF INFORMATION TECHNOLOGY

```
else:  
i=i+1  
print(A)
```

B:

```
A=[1, 10, 8, 7, 12, 14, 13, 18, 22]  
i=0  
for i in A:  
if i%2==0:  
A.remove(i)  
print(A)
```

C:

```
a=[]  
for i in range(20):  
if(i%2 != 0):  
a.append(i)  
print(a)
```

D:

```
a=[]  
for i in range(0,20,2):  
a.append(i)  
print(a)  
E  
a=[i for i in range(1,20,2)]  
print(a)
```

F:

```
a=[i for i in range(20) if(i%2==0)]  
print(a)
```

G:

```
A=[1, 10, 8, 7, 12, 14, 13, 18, 22]  
i=0  
for i in A[:]:  
if i%2==0:  
A.remove(i)  
print(A)
```

H:

```
A=[1, 10, 8, 7, 12, 14, 13, 18, 22]  
i=0  
while i < len(A):  
if A[i]%2==0:  
A.remove(A[i])  
i=i+1  
print(A)
```

MA



11. WAP to raise an exception for any kind of error in the program.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. solve computational problem using python language
 - CO2. familiar with basics syntax and features of python programming language
 - CO3. Hands on experience to online coding tools like colab.
 - CO4. design a program utilizing the features of object oriented concept.
 - CO5. Utilize some of the libraries available for solving problems.
-

MA



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PYTHON PROGRAMMING LAB
(230406)

LIST OF SKILL BASED MINI PROJECT

1. Implement a calculator using Tkinter library.
 2. Design and implementation of Animal Kingdom Classification.
 3. Design and implementation of a real-time, User friendly Currency Converter.
 4. Design and implementation of a File Manager which supports various types of files.
 5. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
 6. Design any game of your choice like tic-tac-toe etc.
 7. Implement a contact book (command line project) capable of storing user data like name, address, phone number, email etc. Use any database for storing the information so that updation and deletion can also be carried out.
 8. Implement binary search algorithm by creating a list from random numbers between any predefined ranges.
 9. Design a program for spam filtering.
 10. Design a dice rolling simulator generating random number from 1 to 6 every time dice is rolled.
 11. Implement countdown clock and timer.
-

WJ



DESIGN AND THINKING LAB
(240406)

LIST OF PROGRAMS

1. Introduction to Arduino Board and Arduino IDE (Installation and Setup)
2. Write a Program to Blink LED (Turn an LED on and off).
3. Write a Program to demonstrate the use of analog output to fade an LED.
4. Write a Program to read an analog input and prints the voltage to the serial monitor.
5. Write a Program to count the number of button pushes.
6. Write a Program to Control an LED using Button.
7. Write a program to detect object using IR Obstacle Sensor.
8. Write a program to detect presence of Gas using GAS Sensor.
9. Write a Program to Control Electronic Appliances using RELAY SHIELD Sensor.
10. Write a Program to measure Temperature and Humidity using DHT11 Sensor.
11. Write a program to detect motion using Motion Sensor (PIR sensor).
12. Write a Program to detect presence of smoke using Smoke Sensor.
13. Write a Program to play melody with a Piezo speaker.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define the basic concept of Embedded System.
- CO2. describe the basic principles of Arduino programming and IDE.
- CO3. familiarize with different types of sensors and related systems.
- CO4. design, implement, debug and test programs/ system.
- CO5. design and develop Smart systems applications.
- CO6. build Arduino board using different sensors.

LIST OF SKILL BASED MINI PROJECT

1. Intelligent home locking system.
 2. Intelligent water level management system.
 3. Home automation using RFID.
 4. Real time clock-based home automation.
 5. Intelligent Automatic Irrigation System
-

NAJ

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Department of Information Technology

ANNEXURE - XI

Gaps in CO Attainment Levels
for
Session July-Dec. 2020 & Dec.-April 2021 Semester
and
Proposed Corrective Measures for Improvement
(Information Technology)
[ITEM - 10]

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Department of Information Technology

COURSE OUTCOMES FEEDBACK (ANALYSIS & IMPACT) (July-Dec 2020)

Parameters for the feedback: Average: 3pts; Agree: 4pts; Strongly Agree: 5pts

Feedback was taken on 5 point scale; Target set for each course = 4 (Agree)

S. No.	Subject Code: Subject Name	Sem	Session : July Dec 2019							Indirect CO Attainment (Average)	Difference= Indirect CO attainment (Session 2020-Session 2019)
			CO1	CO2	CO3	CO4	CO5	CO6			
1	160301: Digital Electronics	3	4.17	4.04	4.08	4.33	4.10	4.27	4.16	0.19	
2	160302: Data Structures	3	4.23	3.92	3.20	4.04	3.92	4.42	3.96	0.44	
3	160304: OOPs and methodolog	3	4.20	4.10	4.17	4.17	4.17	4.04	4.14	-0.06	
4	160303: Computer Graphics and Multimedia	3	4.33	4.10	4.27	4.23	4.23	3.92	4.18	0.06	
5	160503: Theory of Computation	5	4.45	4.35	4.30	4.40	4.30	4.35	4.36	-0.24	
6	160502: Software Engineering	5	4.50	4.00	4.04	4.19	3.50	4.00	4.04	0.09	
7	160504: Microprocessor & Interfacing	5	4.23	3.80	4.00	4.08	4.23	4.15	4.08	0.06	
8	160501: Discrete Structures	5	3.50	4.20	4.25	4.17	4.24	4.20	4.09	0.09	
9	160711: Networking with TCP/IP	7	4.52	4.19	4.00	4.00	4.25	4.58	4.26	-0.13	

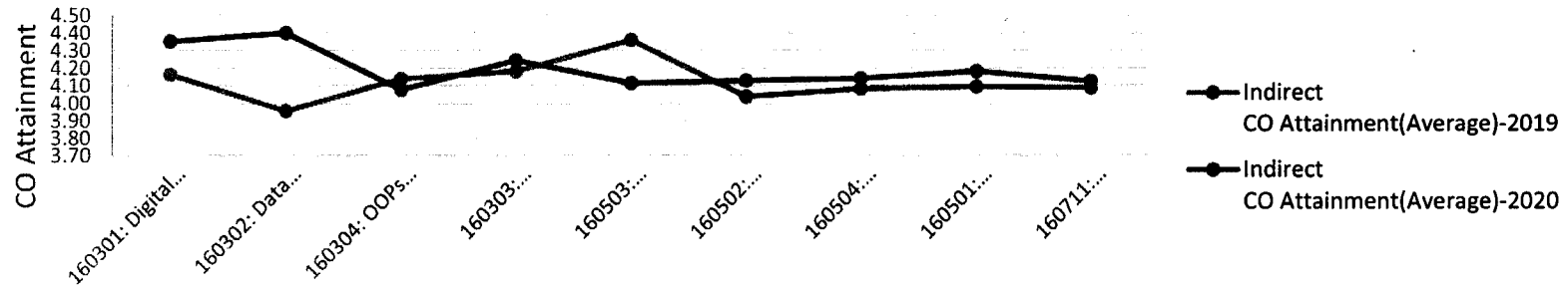
WA

Madhav Institute of Technology and Science, Gwalior

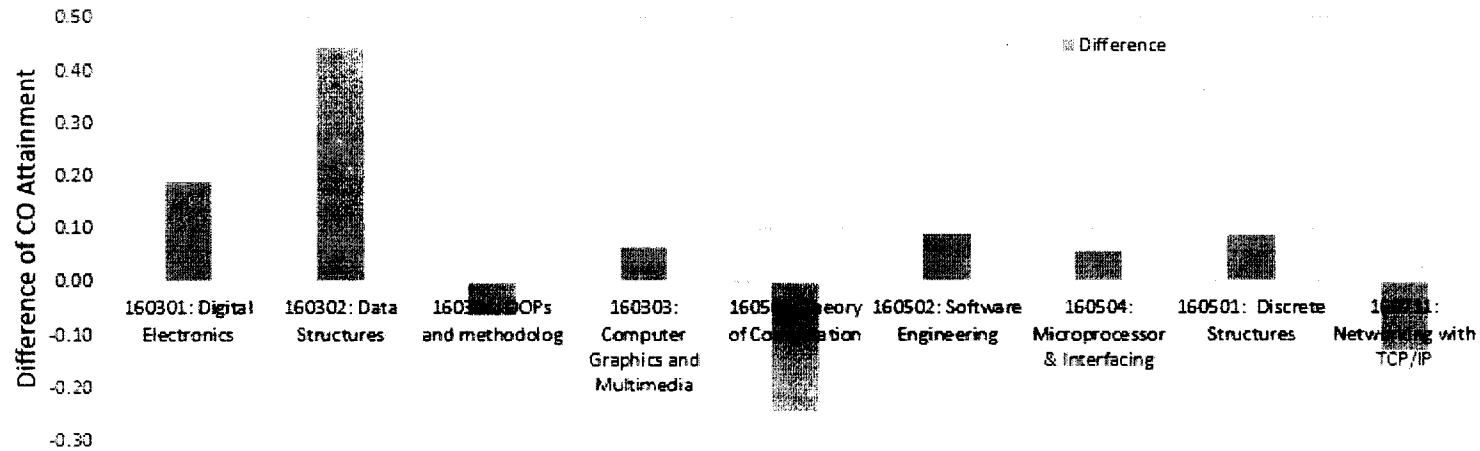
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Analysis of Indirect CO Attainment using CO Feed back (July-Dec 2019 vs July-Dec 2020)



Impact Analysis



24

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Department of Information Technology

Impact Analysis Report:

on the basis of analysed data of current (July -Dec 2020)and previous year(July-Dec 2021), following Issues are addressed :

1. Indirect Co attainments using Co Feedback are improved
2. We could not achieved target for OOP and Methodology (160304), Networking with TCP/IP (160711) and Theory of Computation (160503) current year.
3. We can say, we have found improvements in all aspects of CO Indirect Attainment as compared to previous year.



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Department of Information Technology

ANNEXURE - XII

Curricula Feedback from Various Stakeholders
for
Session July-Dec. 2020 & Dec.-April 2021 semester
(Information Technology)
[ITEM - 11]

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Department of Information Technology

ANNEXURE - XII

Report of Analysis of Feedback on Curriculum Collected From Different Stakeholders

Academic Year: 2020-2021

Session: July – December 2020

Students Feedback:

The students are the most important stakeholders of Technical Education systems. The interest and participation of students at all levels in both internal quality assurance and external quality assurance have to play a central role. We have collected online feedback from our under graduate students Third, Fifth and Seventh semester students. A special seven-point scale feedback form on the curriculum is development. We have received total 597 student's online feedback on the syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.

SESSION: July-December 2020---COURSE CURRICULUM FEEDBACK (by Students on MOODLE)										
Parameter(Average Grading)				1. The course is well designed	2. The syllabus units are balanced	3. The course will be useful for you in future	4. The learning material was available to you	5. The content was clear and easy to understand	6. The course meets your expectations	7. The course was relevant and updated for present needs
Subject Code	Subject Name	Semester	Faculty Name							
160301	Digital Electronics	3	Dr. R. K. Gupta	3.3125	3.3125	3.4375	3.375	3.375	3.0625	3.125

NA

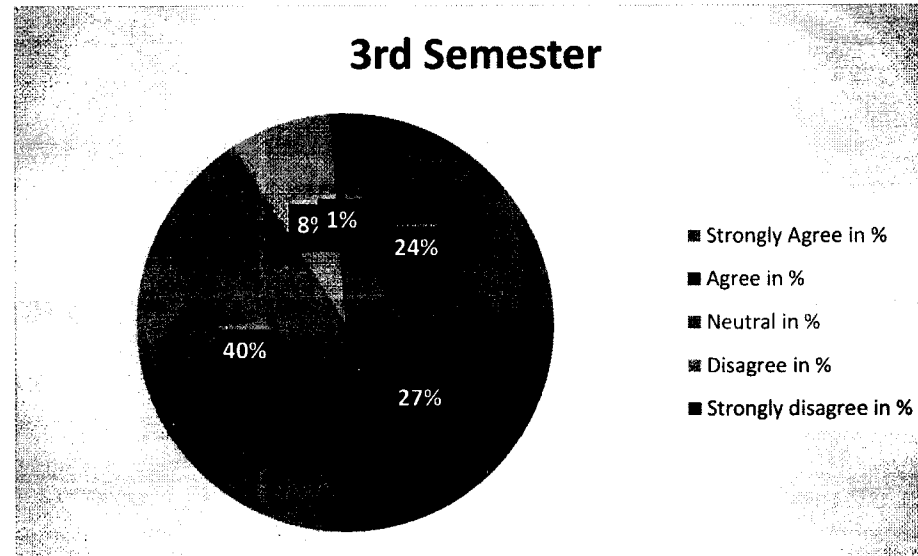
900210	Data Mining & Warehousing	7	Dr. Akhilesh Tiwari	4.026316	3.842105	4.026316	4.026316	3.868421	3.868421	3.789474
160303	Computer Graphics	3	Dr. Manish Dixit	3.4	3.64	3.4	3.52	3.44	3.32	3.2
160711	Networking with TCP/IP	7	Prof. Khushboo Agarwal	4	3.5	4.25	4	3.75	3.5	3.75
160712	Data Mining & Warehousing	7	Dr. Sanjiv Sharma	3.2857143	3.1428571	3.7142857	3.8571429	3.1428571	3.4285714	3.7142857
160504	Microprocessor	5	Prof. Punit K. Johari	3.8181818	3.7272727	4	3.7272727	3.6363636	3.6363636	3.6363636
160302	Data Structures	3	Prof. Rajni Ranjan	3.875	3.875	3.75	4	4	3.625	3.875
160713	Software Testing	7	Prof. Rajeev K. Singh	3.25	3	3.75	3.5	3.25	3.25	3.75
900209	Network Security	7	Prof. Amit K. Majhwar	3.675	3.675	3.7	3.775	3.7	3.65	3.625
160304	Object Oriented Programming and Methodology	3	Prof. Mir Shahnawaz Ahmad	4	4.133333	4.066667	4	4.2	4.333333	4.333333
900208	Soft Computing	7	Prof. Santosh Sahu	3.666667	3.5	3.666667	3.666667	3.333333	3.5	3.666667
620301	Image Processing and Retrieval Techniques	3	Prof. Santosh Sahu	4.181818	3.818182	4.090909	3.636364	3.818182	4.181818	4.363636
900220	R Programming	7	Prof. Arun Kumar	3.8	3.866667	3.6	3.8	3.533333	3.533333	3.6
900222	Computer Networks	7	Prof. Pooja Agrawal	3.888889	4.037037	4.037037	4.074074	4.111111	4.074074	4.037037
160501	Discrete Structures	5	Prof. Aishwarya	4.2	3.8	4	3.8	3.8	4	4.2
620302	Network Security	3	Prof. Shweta Patel	3.5	3.5	3	3.5	3	3.5	3

21

Semester wise Analysis:

Semester 3rd

Subject Code	Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
160301	Digital Electronics		Dr. R. K. Gupta		32.14	53.5	10.7	
160302	Data Structures		Prof. Rajni Ranjan Singh Makwana	41.07	21.47	28.57	8.92	
	Computer Graphics		Dr. Manish Dixit	15.42	36	37.14	11.42	
160303	Object Oriented Programming and Methodology		Prof. Mir Shahnawaz Ahmad	37.11	21.11	43.33		

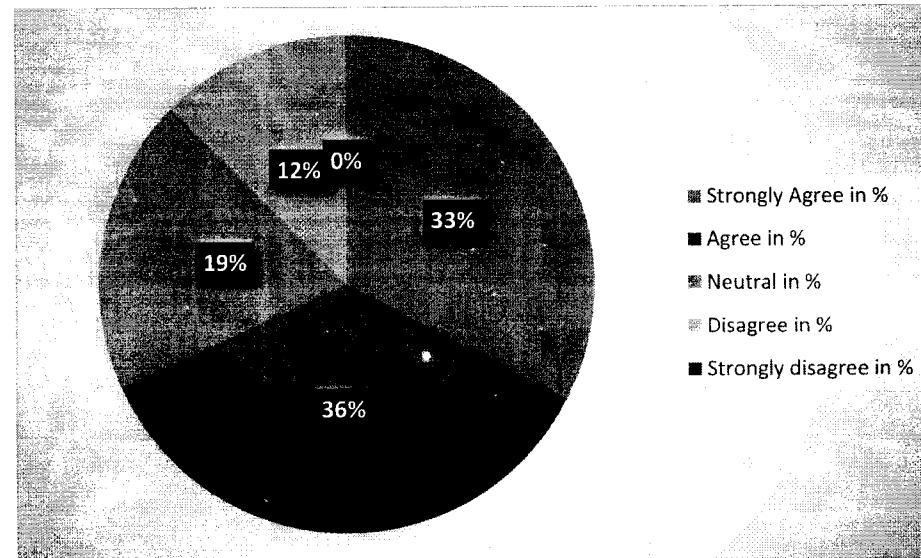


W.L.

On an average 24% students are strongly agree, 27% are agree, 40% are neutral, 8% are disagree and 1% are strongly disagree with the current syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.

Semester 5th

Subject Code	Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
160501	Discrete Structures		Prof. Aishwarya	30.14	54.28	8.57	9.14	
160504	Microprocessor		Prof. Punit K. Johari	37.66	19.48	31.16	16.88	

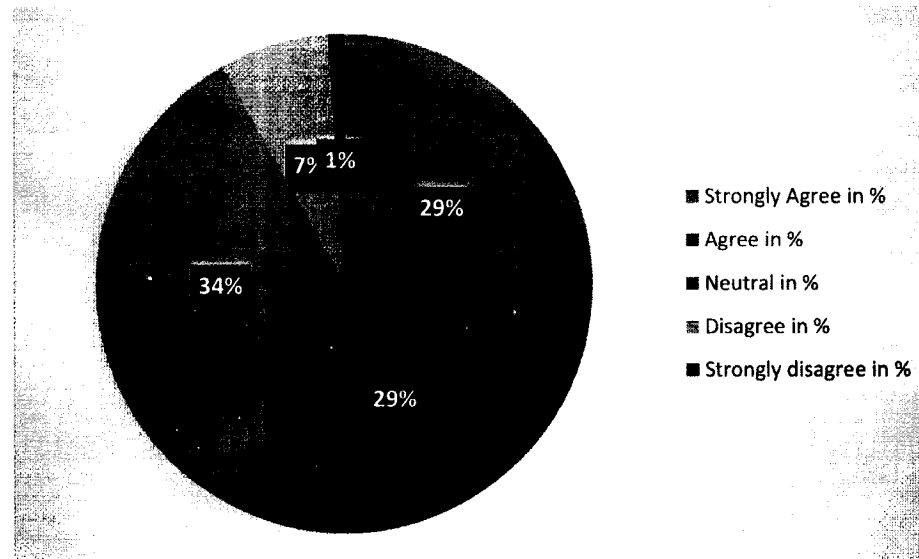


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On an average 33% students are strongly agree, 36% are agree, 19% are neutral, 12% are disagree and 0% are strongly disagree with the current syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.

Semester 7th

160711	Networking with TCP/IP	Prof. Khushboo Agarwal	39.07	24.47	26.57	
160712	Data Mining & Warehousing	Dr. Sanjiv Sharma	37.66	32.46	25.97	
160713	Software Testing	Prof. Rajeev K. Singh	14.28	28.47	39.28	17.85
	Soft Computing	Prof. Santosh Sahu	16.66	23.8	59.52	
	Network Security	Prof. Amit K. Majhwar	28.21	25	35.71	
	Data Mining & Warehousing	Dr. Akhilesh Tiwari	31.57	33.83	29.69	
	R Programming	Prof. Arun Kumar	26.66	32.38	26.66	
	Computer Networks	Prof. Pooja Agrawal	37.03	32.27	28.04	

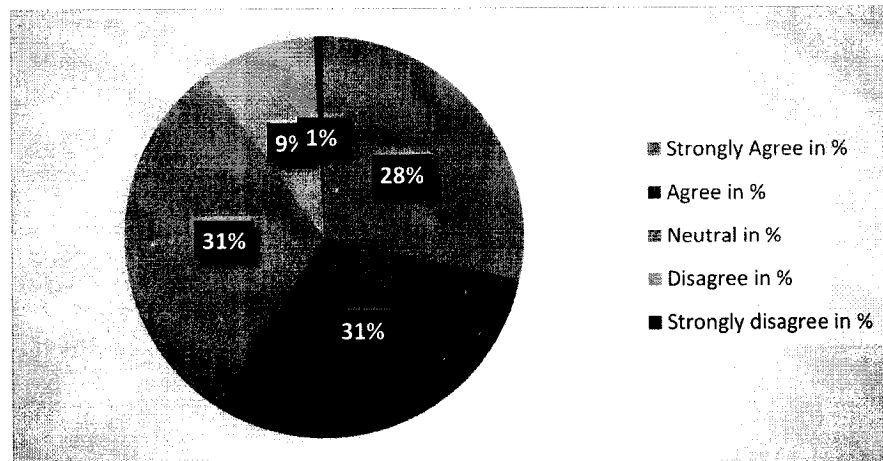


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On an average 29% students are strongly agree, 29% are agree, 34% are neutral, 7% are disagree and 1% are strongly disagree with the current syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.

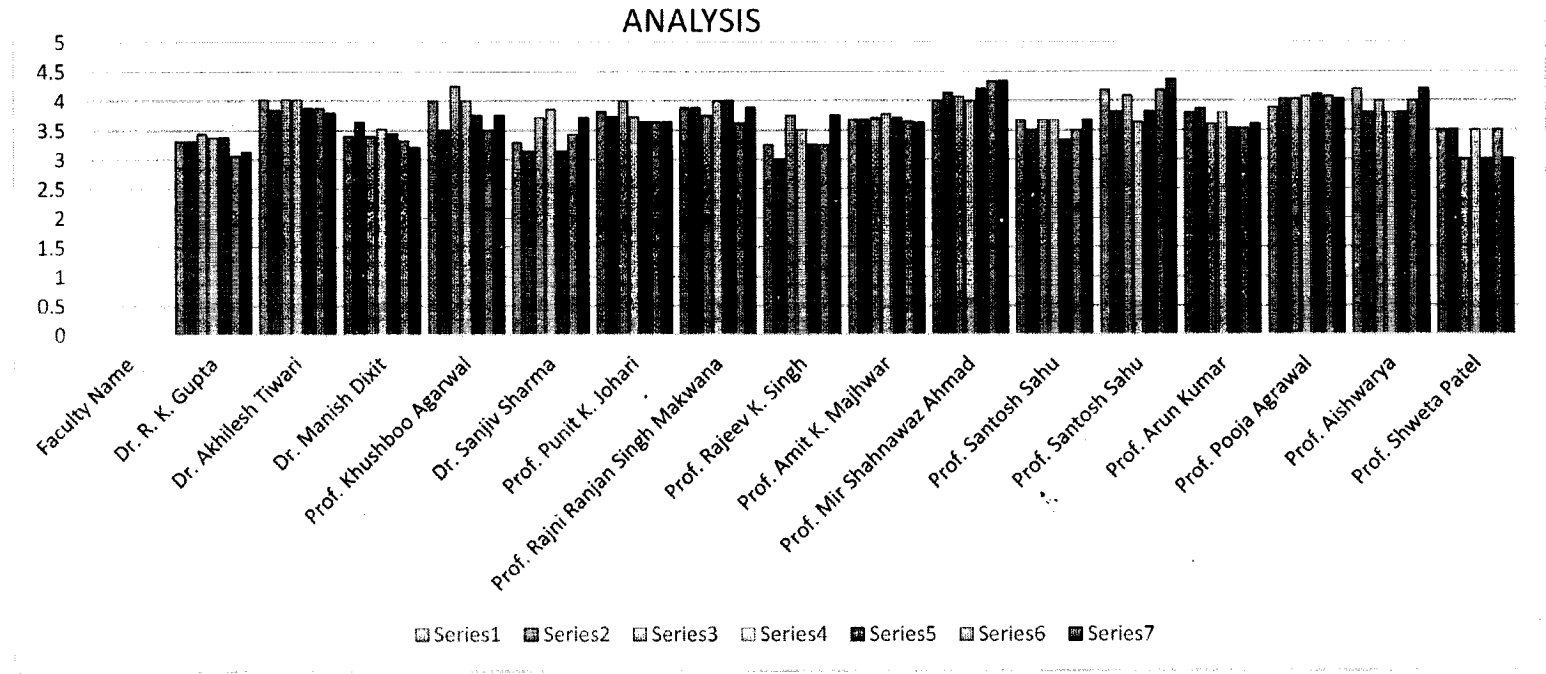
Overall

	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
On average in 3rd Sem	24.29	27.68	40.635	8.0375	1.1425
On average in 5th Sem	33.9	36.88	19.865	13.01	0
On average in 7th Sem	28.8925	29.085	33.93	7.14375	1.02125



ML

Overall average 28% students are strongly agree, 31% are agree, 31% are neutral, 9% are disagree and 1% are strongly disagree with the current syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.



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SESSION: December-March 2021---COURSE CURRICULUM FEEDBACK (by Students on MOODLE)

Parameter(Average Grading)				1.The course is well designed	2. The syllabus units are balanced	3. The course will be useful for you in future	4. The learning material was available to you	5. The content was clear and easy to understand	6. The course meets your expectations	7. The course was relevant and updated for present needs
Subject Code	Subject Name	Semester	Faculty Name							
100015(IoT)	Energy, environment, Ecology and Society	1	Prof. Shweta Patel	4	4	5	4	4	4	4
100015(IT)	Energy, environment, Ecology and Society	1	Prof. Shweta Patel	4.25	4	4	3.75	3.5	3.75	4
100015(AIR)	Energy, environment, Ecology and Society	1	Prof. Shweta Patel	3.5333	3.3333	3.4	3.6	3.4666	3.4666	3.4
230101(IoT)	Introduction to Internet of Things	1	Prof. Vikas Sejwar	3.4	3.5	3.9	3.4	3.6	3.5	3.4
230102(IoT)	Introuction to Computer programming	1	Dr. Sanjiv Sharma	3.5945	3.4864	3.2702	3.1621	3.5134	3.56758	3.594595
230102(AIR)	Introuction to Computer programming	1	Prof. Punit Johari	3.9166	3.8333	3.6	3.6333	3.85	3.8666	3.983333333
620111	Database Systems	1	Prof. Vishwas Shrivastava	3.6666	3.6666	3.3333	3.6666	3.6666	3	3
620112	Distributed Computing	1	Prof. Rajeev K. Singh	3.75	4	4.25	4.5	4.25	4.25	4.25
620113	High Speed Networks	1	Prof. Namrata Agrawal	4.25	3.6666	3.6666	3.6666	3.6666	3.6666	3.666667
620114	Mobile Computing & M- Commerce	1	Prof. Santosh Sahu	3	3	2.5	2.5	3	3	2

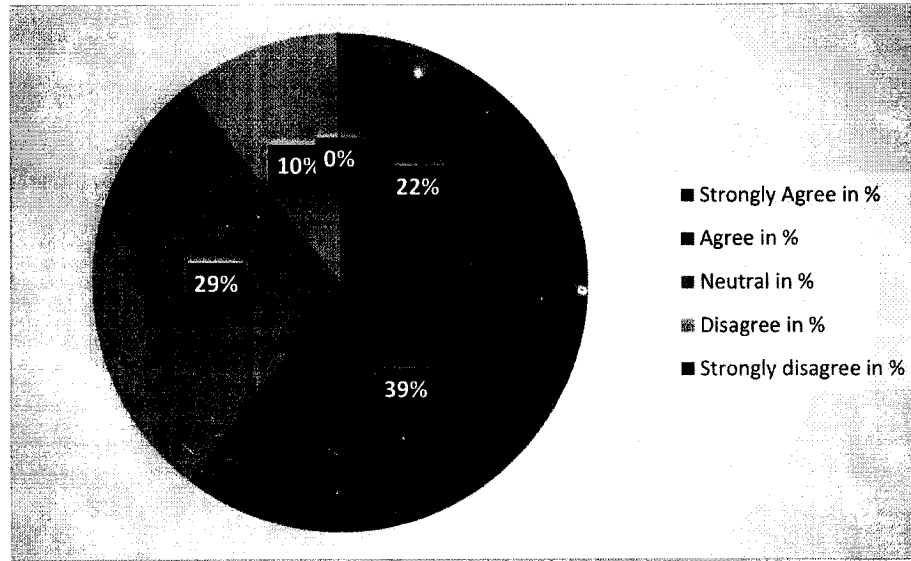
MS

620120	Machine Learning Using Python	1	Prof. Dheeraj Gurjar	4	3.5	3.5	3	4.5	4.5	4
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Semester 1st

Subject Code	Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
100015(IoT)	Energy, environment, Ecology and Society		Prof. Shweta Patel	14.28	45.23	28.57	11.9	
100015(IT)	Energy, environment, Ecology and Society		Prof. Shweta Patel	7.14	75	17.85		
100015(AIR)	Energy, environment, Ecology and Society		Prof. Shweta Patel	20.9	31.42	26.66	20.28	
230101(IoT)	Introduction to Internet of Things		Prof. Vikas Sejwar	14.14	75	10.85		
230102(IoT)	Introuction to Computer programming		Dr. Sanjiv Sharma	19.69	27.79	32.81	17.76	
230102(AIR)	Introuction to Computer programming		Prof. Punit Johari	27.38	33.8	31.9		
620111	Database Systems		Prof. Vishwas Shrivastava	23.8	9.52	52.38	14.28	
620112	Distributed Computing		Prof. Rajeev K. Singh	42.85	32.14	25		
620113	High Speed Networks		Prof. Namrata Agrawal	33.33	66.66			
620114	Mobile Computing & M-Commerce		Prof. Santosh Sahu			71.42	28.57	
620120	Machine Learning Using Python	Prof. Dheeraj Gurjar	35.71	28.57	21.42	14.28		

ML



On an average 22% students are strongly agree, 39% are agree, 29% are neutral, 10% are disagree and 0% are strongly disagree with the current syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.

WZ

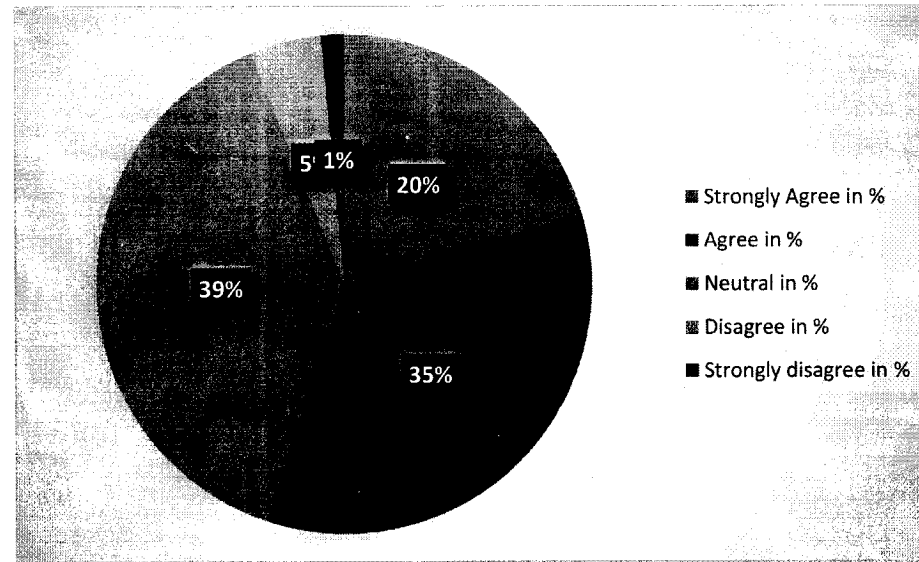
SESSION: January-April 2021---COURSE CURRICULUM FEEDBACK (by Students on MOODLE)

Parameter(Average Grading)				1 .The course is well designed	2. The syllabus units are balanced	3. The course will be useful for you in future	4. The learning material was available to you	5. The content was clear and easy to understand	6. The course meets your expectations	7. The course was relevant and updated for present needs
Subject Code	Subject Name	Semester	Faculty Name							
160401	Design & Analysis of Algorithm	4	Prof Abhishek Dixit	3.857142857	3.928571429	4.071428571	3.928571429	3.928571429	4	4
160402	Database Management System	4	Prof. Dheeraj Gurjar	3.444444444	3.444444444	3.5	3.5	3.611111111	3.444444444	3.444444444
160403	Operating System	4	Prof. Vishwas Shrivastava	3.5	3.666666667	3.611111111	3.444444444	3.388888889	3.777777778	3.611111111
160404	Computer System Organization	4	Prof. Punit Johari	3.444444444	3.666666667	3.777777778	3.888888889	3.444444444	3.777777778	3.777777778
100004	Cyber Security	4	Prof. Shweta Patel	3.681818182	3.590909091	3.590909091	3.727272727	3.818181818	3.590909091	3.818181818
160611 (DE-1)	Network and web security	6	Prof. Santosh Sahu	3.5	3.5	3.5	3.5	3.5	3	2.5
160614 (DE-1)	Cloud Computing	6	Prof. Vikas Sejwar	4.5	4.33	3.5	3.8	4.16	4.33	4.1
100007	Disaster Management	6	Prof. Namrata Agrawal	3.787878788	3.878787879	3.848484848	4	3.787878788	3.787878788	3.666666667
900108 (OC-1)	Software Engineering	6	Prof. Rajeev K. Singh	3.583333333	3.708333333	3.5	3.666666667	3.625	3.541666667	3.541666667
900116 (OC-1)	Data Mining & Warehousing	6	Dr. Akhilesh Tiwari	4	3.967741935	4.096774194	4.193548387	4.064516129	4.096774194	3.935483871

2/11

Semester 4th

Parameter(Average Grading)				Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
Subject Code	Subject Name	Semester	Faculty Name					
160401	Design & Analysis of Algorithm	4	Prof Abhishek Dixit	27.55	41.83	29.59	1.02	0
160402	Database Management System	4	Prof. Dheeraj Gurjar	11.11	36.5	43.65	7.14	1.13
160403	Operating System	4	Prof. Vishwas Shrivastava	23.05	34.12	26.19	10.3	6.34
160404	Computer System Organization	4	Prof. Punit Johari	22.22	25.39	50.79	1.58	0
100004	Cyber Security	4	Prof. Shweta Patel	18.18	35.71	42.85	3.24	0

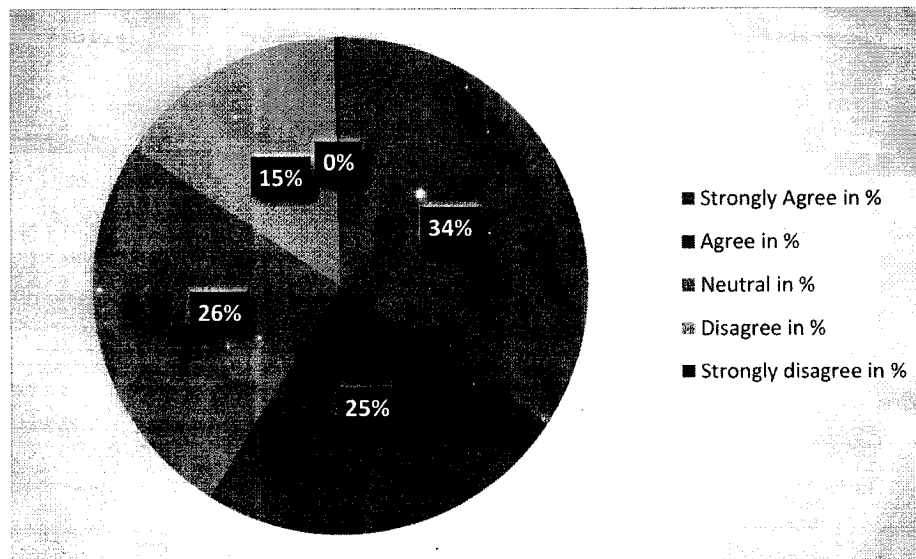


2/1

On an average 20% students are strongly agree, 35% are agree, 39% are neutral, 5% are disagree and 1% are strongly disagree with the current syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.

Semester 6th

Parameter(Average Grading)				Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
Subject Code	Subject Name	Semester	Faculty Name					
160611 (DE-1)	Network and web security	6	Prof. Santosh Sahu	35.71	7.14	7.14	50	0
160614 (DE-1)	Cloud Computing	6	Prof. Vikas Sejwar	35.55	40.83	22.59	1.02	0
100007	Disaster Management	6	Prof. Namrata Agrawal	37.22	21.64	28.57	11.25	1.29
900108 (OC-1)	Software Engineering	6	Prof. Rajeev K. Singh	20.83	27.38	42.85	8.33	0.5
900116 (OC-1)	Data Mining & Warehousing	6	Dr. Akhilesh Tiwari	42.39	25.8	26.26	5.52	0

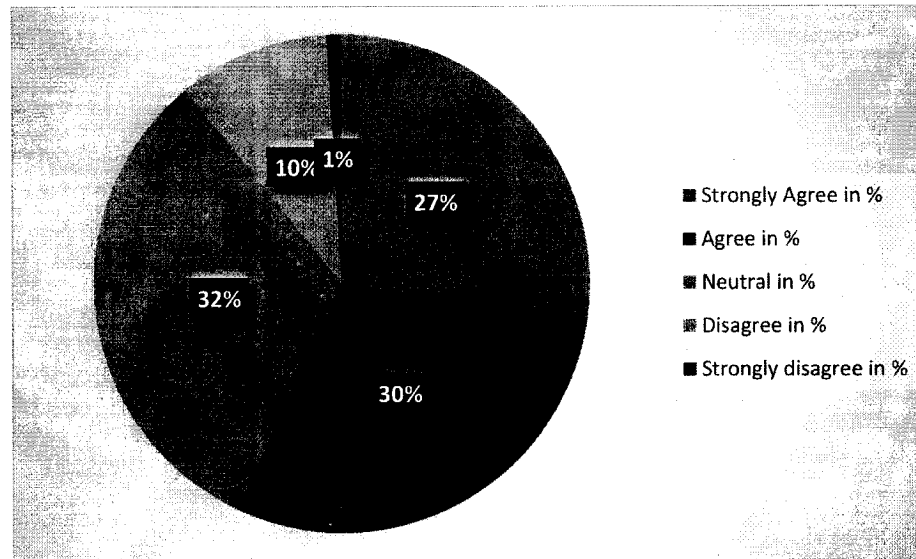


LM

On an average 34% students are strongly agree, 25% are agree, 26% are neutral, 15% are disagree and 0% are strongly disagree with the current syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.

Overall

	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
On average in 4th Sem	20.422	34.71	38.614	4.656	1.494
On average in 6th Sem	34.34	24.558	25.482	15.224	0.358



MA

On an average 27% students are strongly agree, 30% are agree, 32% are neutral, 10% are disagree and 1% are strongly disagree with the current syllabus of the various programmes designed by the Department of Information Technology, MITS Gwalior.

Teachers Feedback:

The institute is autonomous and follows the prescribed curriculum. Still, the respective subject teachers regarding suggestions on improvement of the syllabus take feedback on curriculum. We have received total 22 faculty feedback on the curriculum and analyzed as follows:

COURSE CURRICULUM FEEDBACK

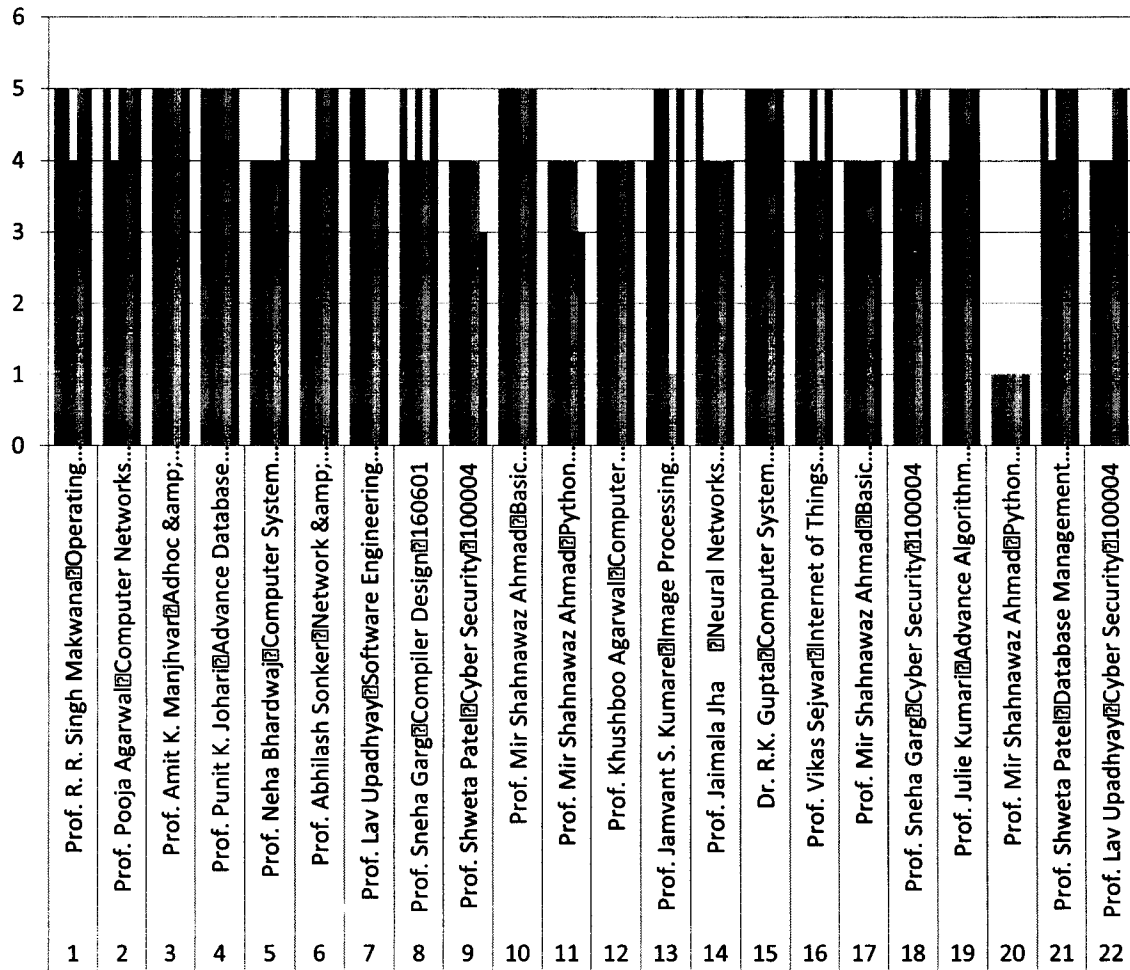
Sr. No.	Select your course	1. The availability of books & E-learning material in the institute is good. (Please give your opinion)	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	3. The course curriculum/ syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]	5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)
1	Prof. R. R. Singh Makwana Operating System 150403	5	5	4	5	5
2	Prof. Pooja Agarwal Computer Networks 150602	5	4	5	5	5
3	Prof. Amit K. Manjhvar Adhoc & Sensor Based Network 620205	5	5	5	5	5
4	Prof. Punit K. Johari Advance Database Management 620201	5	5	5	5	5
5	Prof. Neha Bhardwaj Computer System Organization 150404	4	4	4	4	5
6	Prof. Abhilash Sonker Network & Web Security 160603(a)	4	4	5	5	5
7	Prof. Lav Upadhyay Software Engineering 150605©	5	5	4	4	4

WA

8	Prof. Sneha Garg Compiler Design 160601	5	4	5	4	5
9	Prof. Shweta Patel Cyber Security 100004	4	4	4	4	3
10	Prof. Mir Shahnawaz Ahmad Basic Computer Engineering 100203	5	5	5	5	5
11	Prof. Mir Shahnawaz Ahmad Python Programming 150605(b)	4	4	4	4	3
12	Prof. Khushboo Agarwal Computer Networks 150602	4	4	4	4	4
13	Prof. Jamvant S. Kumare Image Processing BCSL801	4	5	5	1	5
14	Prof. Jaimala Jha Neural Networks & Fuzzy Systems BITL803	5	4	4	4	4
15	Dr. R.K. Gupta Computer System Organization 160404	5	5	5	5	5
16	Prof. Vikas Sejwar Internet of Things & Applications BITL804	4	4	5	4	5
17	Prof. Mir Shahnawaz Ahmad Basic Computer Engineering 100203	4	4	4	4	4
18	Prof. Sneha Garg Cyber Security 100004	4	5	4	5	5
19	Prof. Julie Kumari Advance Algorithm Design 620203	4	5	5	5	5
20	Prof. Mir Shahnawaz Ahmad Python Programming 150605(b)	5	5	5	5	5
21	Prof. Shweta Patel Database Management System 150402	5	4	5	5	5
22	Prof. Lav Upadhyay Cyber Security 100004	4	4	4	5	5

From the above analysis, it is observed that the 94% teachers rated the syllabus reflects current contents. 95% teachers say that the current syllabus is need based and the programmes outcomes, programmes specific outcomes and course outcomes of the syllabi is well defined. On an average 94% teachers are satisfied with the current syllabus designed by the Department of Information Technology, MITS Gwalior.

VAJ

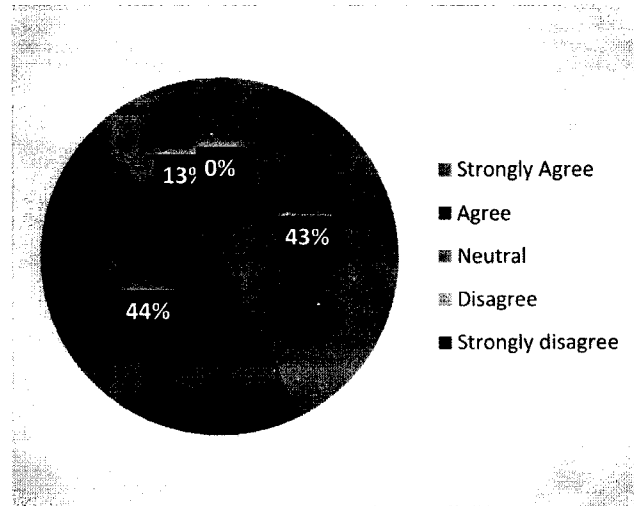


- 1. The availability of books & E-learning material in the institute is good. (Please give your opinion)
- 2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?
- 3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)
- 4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present. [If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]
- 5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)

MA

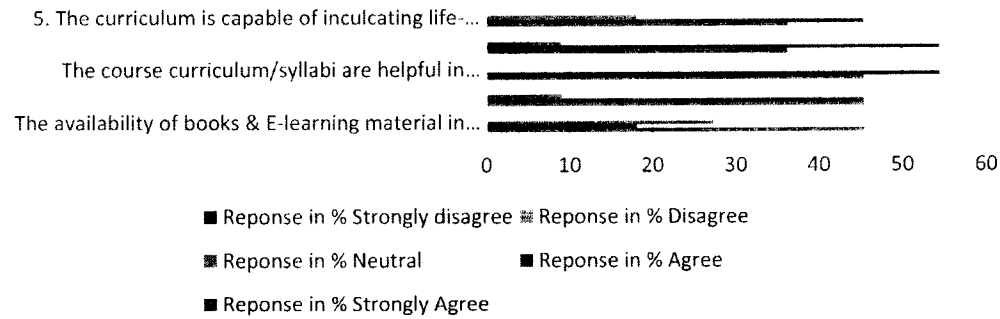
December 2020 – March 2021:

Q.No.	Curriculum Evaluation Point	Reponse in %				
		Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
1	The availability of books & E-learning material in the institute is good	45.45	18.18	27.27	0	0
2	The Courses and content are up to date.	45.45	45.45	9.09	0	0
3	The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	45.45	54.54	0	0	0
4	The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	36.36	54.54	9.09	0	0
5	5. The curriculum is capable of inculcating life-long learning abilities in students.	36.36	45.45	18.18	0	0



WA

Chart Title



July – December 2020

Q.No.	curriculum Evaluation Point	Reponse in %				
		Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
1	The availability of books & E-learning material in the institute is good	63.15	26.31	5.26	5.26	0
2	The Courses and content are up to date.	42.1	47.36	5.26	5.26	0
3	The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	63.15	21.05	10.5	5.26	0
4	The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	36.84	52.63	5.26	5.26	0
5	The curriculum is capable of inculcating life-long learning abilities in students.	47.36	36.84	10.5	5.26	0

VA

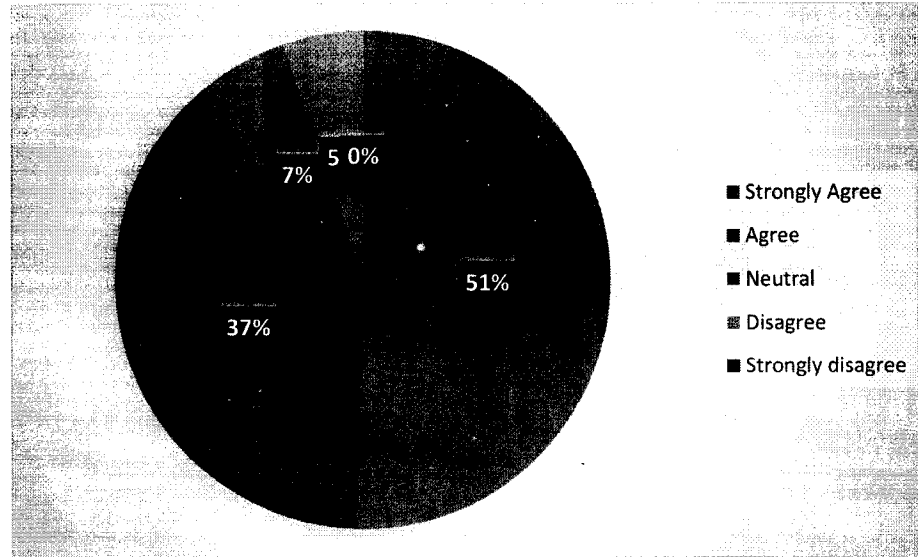
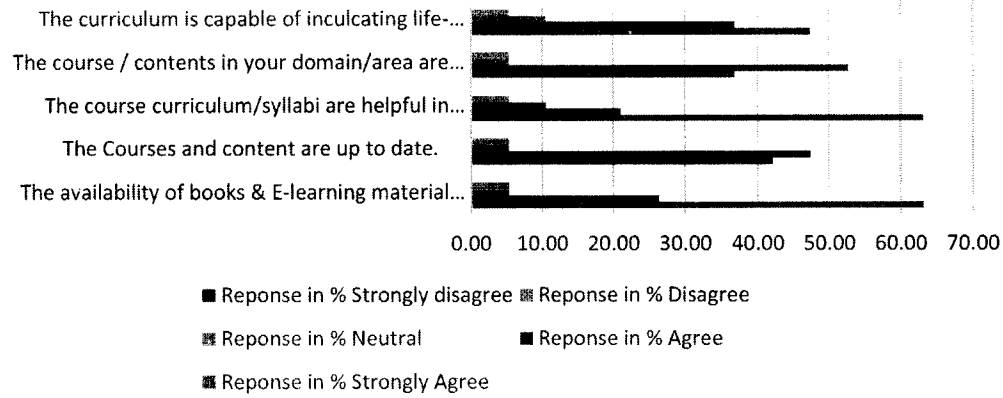
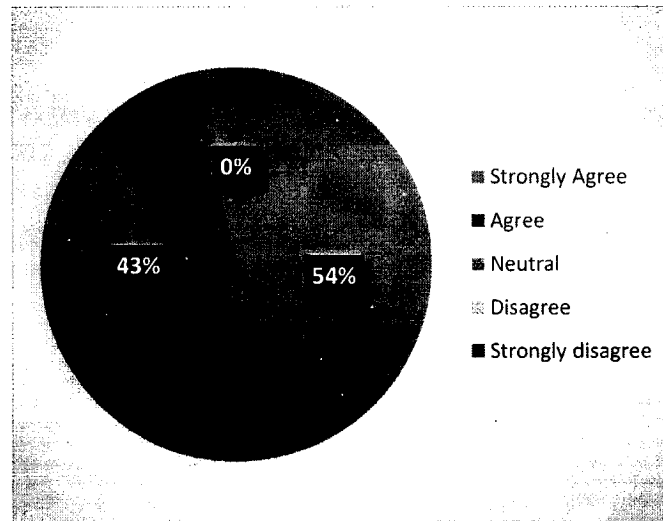


Chart Title



W1

Q.No.	curriculum Evaluation Point	Reponse in %				
		Strongly Agree	Agree	Neutra	Disagree	Strongly disagree
1	The availability of books & E-learning material in the institute is good	66.66	33.33	0	0	0
2	The Courses and content are up to date.	33.33	66.66	0	0	0
3	The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	58.33	41.66	0	0	0
4	The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	66.66	33.33	0	0	0
5	The curriculum is capable of inculcating life-long learning abilities in students.	41.66	41.66	16.66	0	0



WA

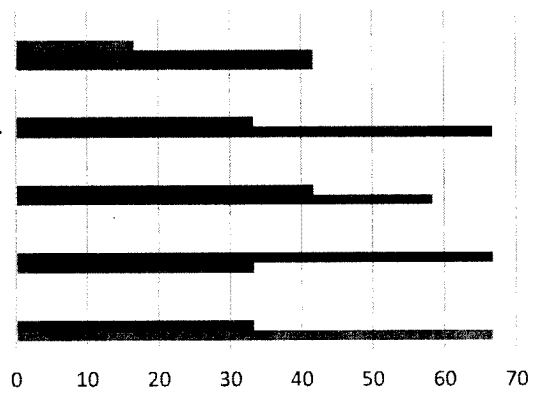
The curriculum is capable of inculcating life-long learning abilities in students.

The course / contents in your domain/area are well designed and frequently updated, hence...

The course curriculum/syllabi are helpful in meeting the higher studies/placement...

The Courses and content are up to date.

The availability of books & E-learning material in the institute is good



■ Reponse in % Strongly disagree ■ Reponse in % Disagree
■ Reponse in % Neutral ■ Reponse in % Agree
■ Reponse in % Strongly Agree

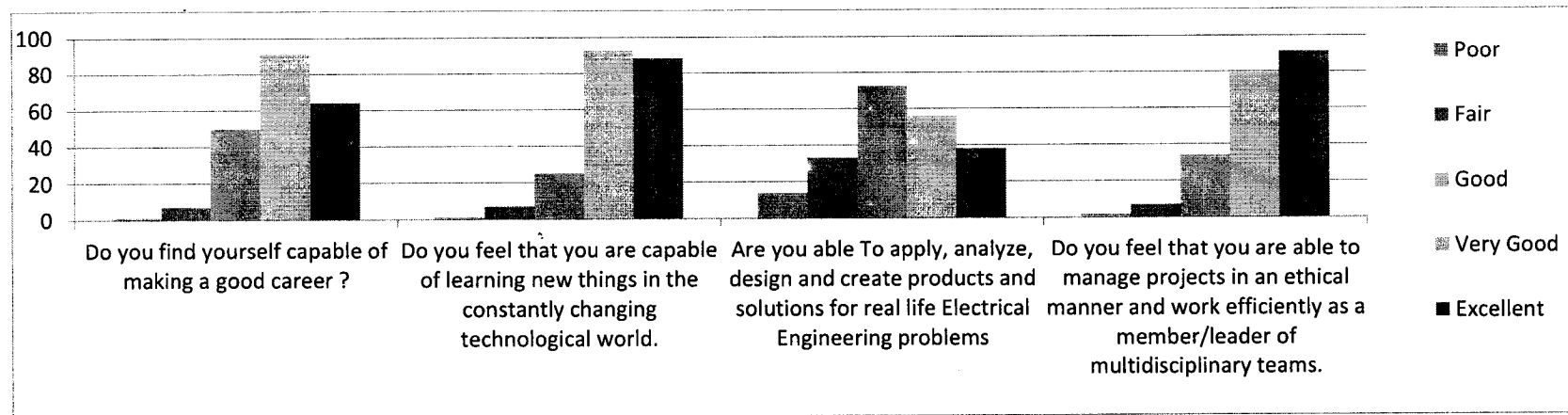
WE

Alumni Feedback:

ALUMNI SATISFACTION SURVEY: (2019-2020): Sample Size : 213

SUMMARY SHEET (Alumni Satisfaction Survey) Sample Size : 213

Parameter (Average Grading)	Poor	Fair	Good	Very Good	Excellent	Alumni Satisfaction Index
Do you find yourself capable of making a good career ?	1	7	50	91	64	3.99
Do you feel that you are capable of learning new things in the constantly changing technological world.	1	7	25	92	88	4.22
Are you able To apply, analyze, design and create products and solutions for real life Electrical Engineering problems	14	33	72	56	38	3.33
Do you feel that you are able to manage projects in an ethical manner and work efficiently as a member/leader of multidisciplinary teams.	2	7	34	79	91	4.17
Alumni Satisfaction Index (ASI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Fair, 1: Poor)						



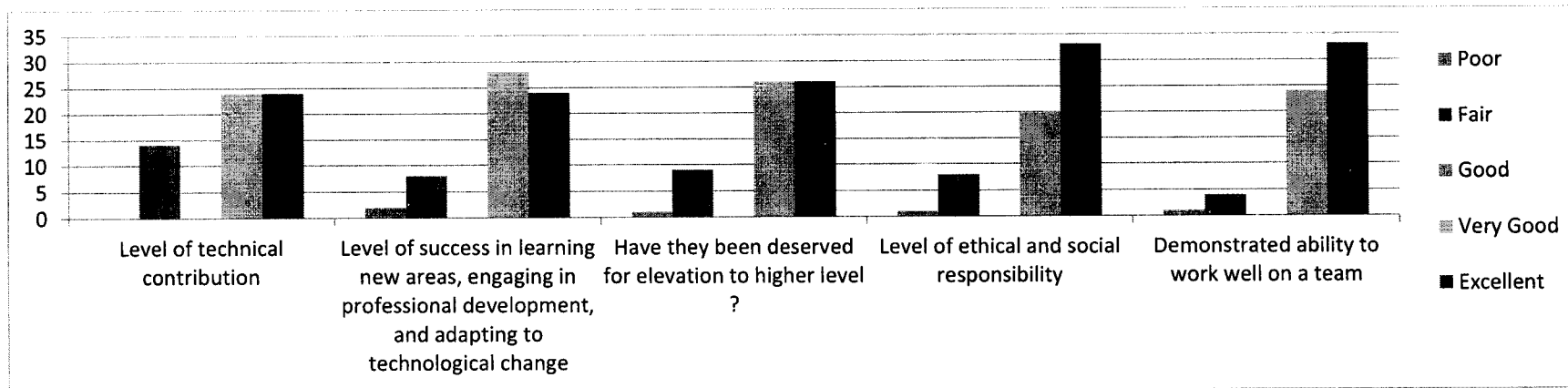
2/11

Employer Feedback:

EMPLOYER SATISFACTION SURVEY : (2019-2020) : Sample Size : 62

SUMMARY SHEET (Employer Satisfaction Survey) Sample Size : 62

Parameter (Average Grading)	Poor	Fair	Good	Very Good	Excellent	Employer Satisfaction Index
Level of technical contribution	0	14	0	24	24	3.94
Level of success in learning new areas, engaging in professional development, and adapting to technological change	2	8	0	28	24	4.03
Have they been deserved for elevation to higher level ?	1	9	0	26	26	4.08
Level of ethical and social responsibility	1	8	0	20	33	4.23
Demonstrated ability to work well on a team	1	4	0	24	33	4.35
Employer Satisfaction Index (ESI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Fair, 1: Poor)						



WV

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Department of Information Technology

ANNEXURE - XIII

Course Outcomes (COs) feedback
for
Session July-Dec. 2020 & Dec.-April 2021 semester
(Information Technology)
[ITEM - 12]

Madhav Institute of Technology and Science, Gwalior

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Information Technology

Analysis and impact report of Course Outcomes (COs) feedback
of various courses from students (for the July - Dec. 2020 semester and Dec. 2020 - April 2021 semester)

Course Name	Course outcomes	Session: July-Dec. 2019					Session: July-Dec. 2020							
		Direct Attainment %	Indirect Attainment %	Total Attainment %	Target	Gap	Action Taken	Direct Attainment %	Indirect Attainment %	Total Attainment %	Target	Gap	Action Taken	
160301: Digital Electronics	CO1	Illustrate various number systems, Binary codes and its application in digital design.	67	60.87	65.774	60	-	Proper coverage & assignment of COs in the question paper is required.	65	60.9	64.174	60	-	Proper coverage & assignment of COs in the question paper is required.
	CO2	Identify the logic functions, circuits, truth tables and also apply the laws of Boolean algebra to simplify circuits and expressions.	48	70.45	52.49	60	7.51		58	70.5	60.49	60	-	
	CO3	Develop the formal procedures for the analysis and design of combinational circuits.	52	71.59	55.918	60	4.08		72	71.6	71.918	60	-	
	CO4	Analyse sequential circuit's components and their usability in digital circuits.	43	72.86	48.972	60	11		63	72.9	64.972	60	-	
	CO5	Compare the concept of memories, programmable devices and digital ICs.	38	63.38	43.076	60	16.9	Arrangement of Extra classes	45	63.4	48.676	60	11.324	Arrangement of Extra classes
	CO6	Design and analyze circuits for digital arithmetic.	19	74.38	30.076	60	29.9		55	74.4	58.876	60	1.124	
160302: Data Structures	CO1	Outline the basics of algorithms and their performance criteria.	86	77.03	84.206	60	-	Proper coverage & assignment of COs in the question paper is required.	86	77.0	84.206	60	-	Proper coverage & assignment of COs in the question paper is required.
	CO2	Explain the working of linear and non-linear data structures.	78	79.71	78.342	60	-		75	72.9	74.572	60	-	
	CO3	Identify the appropriate data structure to solve the specific problems.	78	72.65	76.93	60	-		78	63.4	75.076	60	-	
	CO4	Analyse the performance of various data structures and their applications.	15	72.11	26.422	60	33.6		45	74.4	50.876	60	9.124	Arrangement of Remedial classes
	CO5	Evaluate the time and space complexities of various data structures and their applications.	23	70.68	32.536	60	27.5		62	77.0	65.006	60	-	
	CO6	Design the optimal algorithmic solutions for various problems	20	66.84	29.368	60	30.6		22	65.0	30.6	60	29.4	

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160304: OOPs and methodology	CO1	Relate the concepts and significance of OOPs in real world.	70	78.62	71.724	60	-	Arrangement of Extra classes	92.8	78.6	89.964	60	-
	CO2	Demonstrate adeptness of object oriented programming to solve problems using Object oriented concepts	71	76.04	72.008	60	-		92.8	76.0	89.448	60	-
	CO3	Apply object oriented programming to develop solutions of problems using standard language constructs.	47	74.08	52.416	60	7.58		88.8	74.1	85.856	60	-
	CO4	Analyze data flow diagrams and flow charts for small/ moderate problems	46	74.44	51.688	60	8.31		86.4	74.4	84.008	60	-
	CO5	Determine how to simulate the problem in field of Operating system, Computer networks and real world problems.	65	73.55	66.71	60	-		93.6	73.6	89.59	60	-
	CO6	Develop software using concepts of objects, associations and integrity constraint.	74	67.42	72.684	60	-		84.8	67.4	81.324	60	-
160303: Computer Graphics and Multimedia	CO1	Illustrate the fundamental concepts of Computer Graphics, hardware & software components and its applications.	91	71	87	60	-	Arrangement of Extra classes	71.2	69.6	70.87304	60	-
	CO2	Explain various graphical image generation & manipulation methods and algorithms.	74	75	74.2	60	-		77.6	76.8	77.44232	65	-
	CO3	Apply various methods of generation & manipulation of images for creating graphical images and color models.	65	74	66.8	60	-		80	71.0	78.2029	60	-
	CO4	Explain various rendering, illumination and color models of realistic image or pictures using image processing techniques.	77	68	75.2	60	-		83.2	76.8	81.92232	60	-
	CO5	Discuss various methods to create natural seen & realistic images in 2D & 3D space.	53	69	56.2	60	3.8		77.6	71.0	76.2829	60	-
	CO6	Design & analysis of various graphical image processing techniques and animation.	70	66	69.2	60	-		85.6	76.8	83.84232	75	-
160302: Data Structure LAB	CO1	Outline the basics of algorithms and their performance criteria.	62	87	67	60	-	Arrangement of Extra classes	75	65.0	73	60	-
	CO2	Explain the working of linear and non-linear data structures.	71	85	73.8	60	-		95	62.0	88.4	75	-
	CO3	Identify the appropriate data structure to solve the specific problems.	82	74	80.4	60	-		84	67.0	80.6	60	-
	CO4	Analyse the performance of various data structures and their applications.	75	75	75	60	-		83	59.0	78.2	60	-
	CO5	Evaluate the time and space complexities of various data structures and their applications.	91	72	87.2	60	-		67	57.0	65	60	-

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	CO6	Design the optimal algorithmic solutions for various problems	88	69	84.2	60	-		68	58.0	66	60	-	
160303: Computer Graphics LAB	CO1	Demonstrates the fundamental concepts of Computer Graphics and its applications.	62	78	65.2	60	-		72	52.0	68	60	-	
	CO2	Explain and use hardware's and software's component of computer graphics	100	75	95	60	-		65	52.0	62.4	60	-	
	CO3	Apply various image generation, manipulations and color model techniques in coding.	72	85	74.6	60	-		63	85.0	67.4	60	-	
	CO4	Implement algorithms for create and manipulate image in programs.	100	95	99	60	-		68.3	65.0	67.64	60	-	
	CO5	Develop the ability to write computer programs for create image and animation using graphics concepts.	96	75	91.8	60	-		72.5	65.9	71.18	60	-	
	CO6	Develop application programs and projects in terms of image and animation using computer graphics.	88	72	84.8	60	-		69	50.5	65.3	60	-	
160304: Object Oriented Programming LAB	CO1	Select proper arithmetic, logical, relational, and string manipulation expressions to process data.	60	85	65	60	-		70	85.0	73	60	-	
	CO2	Demonstrate the use of various OOPs concepts with the help of programs.	76	74	75.6	60	-		72	74.0	72.4	60	-	
	CO3	Apply validation techniques to build a reliable solution to a given problem.	92	75	88.6	60	-		92	75.0	88.6	60	-	
	CO4	Analyze and write programs to solve more complicated problems using the concepts of Object Oriented Methodology.	84	76	82.4	60	-		81	80.0	80.8	60	-	
	CO5	Choose appropriate programming concepts as and when required in the future application development.	92	72	88	60	-		92	72.0	88	60	-	
	CO6	Construct a complete class definition with in the class definition, write class and instance methods including the constructor and overloaded methods.	92	66	86.8	60	-		85	66.0	81.2	60	-	
160503: Theory of Computation	CO1	Explain the basic concepts of switching and finite automata theory and languages.	60	63.56	60.712	60	-	Proper coverage & assignment of COs in the question paper is required.	65.6	69.6	66.39304	60	-	Proper coverage & assignment of COs in the question paper is required.
	CO2	Relate practical problems to languages, automata, computability, and complexity.	57	61.89	57.978	60	2.02		76.8	76.8	76.80232	65	-	
	CO3	Construct abstract models of computing and analyse their power to recognize the languages.	44	71.04	49.408	60	10.6		70.4	71.0	70.5229	60	-	

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	CO4	Construct and analyze the grammar.	67	69.03	67.406	60	-	Arrangement of Remedial classes	94.4	76.8	90.88232	60	-	Remedial classes
	CO5	Apply mathematical models and descriptors in various computing theories	36	63.78	41.556	60	18.4		52	71.0	55.8029	60	4.1971	
	CO6	Solve problems in computer science using mathematical and formal techniques.	18	72.71	28.942	60	31.1		88	71.0	84.6	60	-	
160502: Software Engineering	CO1	List various software models with respect to their accuracy and needs of the customer requirement.	60	76.34	63.268	60	-	Arrangement of Remedial Classes	65	76.3	67.268	60	-	Arrangement of Remedial Classes
	CO2	Explain the real world problems using software engineering concepts.	55	71.57	58.314	60	1.69		65	71.6	66.314	60	-	
	CO3	Develop the technique and results with customer expectations.	49	69.92	53.184	60	6.82		47	69.9	51.584	60	8.416	
	CO4	Identify and how to use various cost estimation techniques used in software engineering.	57	70.46	59.692	60	0.31		72	70.5	71.692	60	-	
	CO5	Compare design of a system, component, or process to meet desired needs within realistic constraints	53	69.38	56.276	60	3.72		57	69.4	59.476	60	0.524	
	CO6	Develop the techniques, skills and software engineering tools necessary for engineering domain.	74	71.75	73.55	60	-		78	71.8	76.75	60	-	
160504: Microprocessor & Interfacing	CO1	Classify the concepts of different advanced microprocessors and microcontroller.	52	87	59	60	1	Arrangement of Extra Classes	64.8	69.6	65.75304	60	-	Arrangement of Extra Classes
	CO2	Illustrate the various peripheral interfaces, controllers and bus standards.	49	88	56.8	60	3.2		80	76.8	79.36232	65	-	
	CO3	Build a system using peripheral devices and controllers for 8086 microprocessor.	52	86	58.8	60	1.2		74.4	71.0	73.7229	60	-	
	CO4	Distinguish the interface with various devices to the microprocessor.	68	75	69.4	60	-		80.8	76.8	80.00232	60	-	
	CO5	Design an interface for various devices on 8086/8051 based systems.	50	74	54.8	60	5.2		70.4	71.0	70.5229	60	-	

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	CO6	Develops skills in assembly language programming for 8051 & 8086 applications.	36	72	43.2	60	16.8		77.6	76.8	77.44232	75	-	
160501: Discrete Structures	CO1	understand the basic concepts of set theory, propositional logic, graph theory, discrete numeric function and algebraic structure.	69	78.8	70.96	60	-	Proper coverage & assignment of COs in the question paper is required.	73.6	69.6	72.79304	60	-	Proper coverage & assignment of COs in the question paper is required.
	CO2	Illustrate the knowledge of course content and distinguish between them in terms of their applications.	84	67.59	80.718	60	-		83.2	76.8	81.92232	60	-	
	CO3	Implement the course content to solve the problems.	87	62.33	82.066	60	-		61.6	71.0	63.4829	60	-	
	CO4	Apply the concept of studied topics with suitable technique faced in engineering problems.	11	66.39	22.078	60	37.9		58.4	76.8	62.08232	60	-	
	CO5	Analyze the basic concepts of set theory, propositional logic, graph theory, discrete numeric function and algebraic structure to examine the real world problems	94	69.36	89.072	60	-		Arrangement of Remedial classes	88	71.0	84.6029	60	
	CO6	Design the analytical skill and interpret applications of engineering beneficial in real time troubleshooting.	17	59.73	25.546	60	34.5	77		68.0	75.2	60	-	
	160503: Theory of Computation LAB	CO1	Judge various model of computation.	84	84	84	60	-	more practice questions will be provided	65	52.0	62.4	60	-
CO2		Construct abstract models of computing.	84	85	84.2	60	-	84		85.0	84.2	60	-	
CO3		Infer the power of abstract models in computing to recognize the languages.	56	88	62.4	60	-	56		88.0	62.4	60	-	
CO4		Demonstrate analytical thinking and intuition for problem solving situations in related areas of theory of computation.	80	75	79	60	-	80		75.0	79	60	-	
CO5		Explain the limitations of computation in solving problems.	56	74	59.6	60	0.4	59		74.0	62	60	-	
CO6		Define set of rules for syntax verification	92	73	88.2	60	-	92		73.0	88.2	60	-	
160502: Software Engineering LAB	CO1	Define basic concepts of UML.	88	85	87.4	60	-	-	85	69.6	81.91304	60	-	-
	CO2	Illustrate the software development process using different tools.	88	74	85.2	60	-		100	76.8	95.36232	60	-	
	CO3	Apply the UML to solve different common modeling problems.	96	75	91.8	60	-		92.8	71.0	88.4429	60	-	
	CO4	Utilize the knowledge of Software engineering and project management.	92	85	90.6	60	-		100	76.8	95.36232	60	-	

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	CO5	Analyze the vocabulary, rules, and idioms of the UML and learn how to model it effectively.	96	86	94	60	-		100	71.0	94.2029	60	-	
	CO6	Design the systems, from concept to executable artifact, using object oriented techniques.	92	82	90	60	-		100	76.8	95.36232	75	-	
160504: Microprocessor and interfacing LAB	CO1	Explain types of instructions and addressing modes.	64	88	68.8	60	-		92	88.0	91.2	60	-	provide practical demonstration of better understanding
	CO2	Make use of Hex code needed in assembly language	100	85	97	60	-		92	85.0	90.6	60	-	
	CO3	Experiment with various peripheral devices to interface with microprocessor.	68	74	69.2	60	-		88	74.0	85.2	60	-	
	CO4	Simplify the arithmetic, Logical, etc. problems using instruction set of 8086/8051 microprocessor.	88	85	87.4	60	-		40	85.0	49	60	11	
	CO5	Determine the process required in interfacing with 8086/8051.	64	72	65.6	60	-		92	72.0	88	60	-	
	CO6	Develop the assembly language programs in 8086/8051 to solve a real world problem.	80	71	78.2	60	-		68	71.0	68.6	60	-	
160711: Networking with TCP/IP	CO1	define the concept of computer network and various layered architecture.	26	73.33	35.466	60	24.5	Proper coverage & assignment of COs in the question paper is required.	93.6	69.6	88.79304	60	-	Arrangement of Remedial classes
	CO2	compare the classless and class full addressing of IPV4 .	24	66.64	32.528	60	27.5		76	76.8	76.16232	65	-	
	CO3	identify the different types of networking devices and their functions within a network.	24	64.99	32.198	60	27.8		97.6	71.0	92.2829	60	-	
	CO4	analyze various protocols of computer networks for assisting network design and implementation.	21	66.07	30.014	60	30	98.4	76.8	94.08232	60	-		
	CO5	design client server applications and communication model and protocols for communication.	14	67.75	24.75	60	35.3	95.2	71.0	90.3629	60	-		
	CO6	elaborate various TCP/IP protocol for achieving multimedia and security services.	10	66.28	21.256	60	38.7	74.4	76.8	74.88232	75	0.1177		

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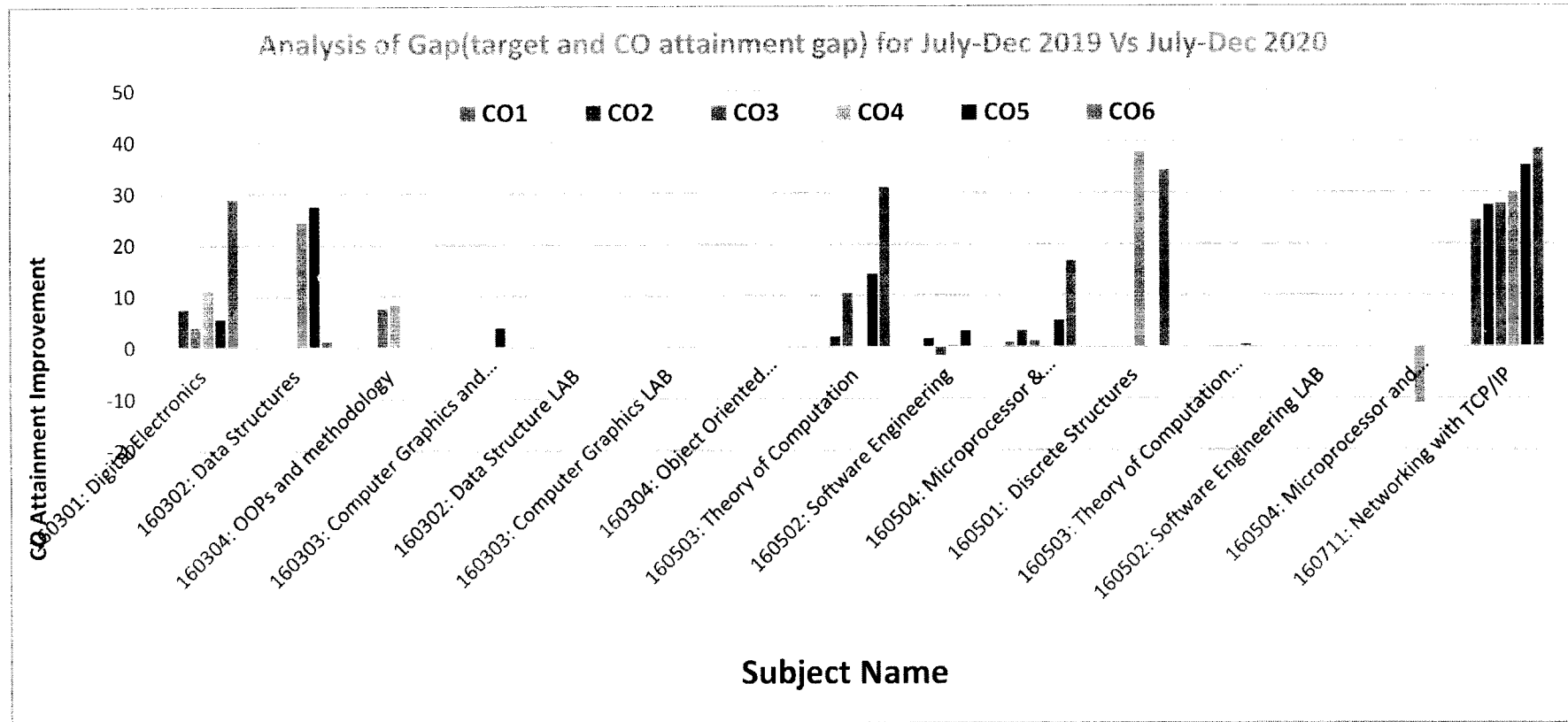
Difference of Gaps (Session 2019-2020)						
Course Name	CO1	CO2	CO3	CO4	CO5	CO6
160301: Digital Electronics	0	7.51	4.082	11	5.6	28.8
160302: Data Structures	0	0	0	24.5	27.46	1.232
160304: OOPs and methodology	0	0	7.584	8.31	0	0
160303: Computer Graphics and Multimedia	0	0	0	0	3.8	0
160302: Data Structure LAB	0	0	0	0	0	0
160303: Computer Graphics LAB	0	0	0	0	0	0
160304: Object Oriented Programming LAB	0	0	0	0	0	0
160503: Theory of Computation	0	2.022	10.592	0	14.25	31.058
160502: Software Engineering	0	1.686	-1.6	0.31	3.2	0
160504: Microprocessor & Interfacing	1	3.2	1.2	0	5.2	16.8
160501: Discrete Structures	0	0	0	37.9	0	34.454
160503: Theory of Computation LAB	0	0	0	0	0.4	0
160502: Software Engineering LAB	0	0	0	0	0	0
160504: Microprocessor and interfacing LAB	0	0	0	-11	0	0
160711: Networking with TCP/IP	24.534	27.472	27.802	30	35.25	38.62631884

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Impact Analysis Report:

on the basis of analysed data of current (July -Dec 2020)and previous year(July-Dec 2021), following Issues are addressed :

1. Overall CO attainments are improved.
2. Gap of target and CO attainment is decreased.
3. We could not achieved target for Software Engineering (160502) and Microprocessor Lab (160503) in current year and found more gap in between CO attainment and target as compare to previous year.
4. We can say, we have found improvements in all aspects of CO Attainment as compared to previous year.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XIV

Scheme & Syllabi
of
M. Tech II and III Semester
(Batch Admitted in 2020-21)
(Information Technology)
Under Flexible Curriculum

[ITEM-13]



Master of Technology (Information Technology) (Semester-II) Recommended W.E.F JULY 2020
Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits
			Theory Slot			Practical Slot		MOOCs			L	T	P	
			End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam					
1.	630211	Algorithms Design Techniques and Analysis	70	20	10	-	-	-	-	100	3	-	-	3
2.	630212	Advanced Topics in Data Mining & Warehousing	70	20	10	-	-	-	-	100	3	-	-	3
3.	630213	Image Processing and Retrieval Techniques	70	20	10	-	-	-	-	100	3	-	-	3
4.	DE	Departmental Elective-II [#]	-	-	-	-	-	25	75	100	3	-	-	3
5.	OC	Open Category Course ^{##} (OC-2)	70	20	10	-	-	-	-	100	3	-	-	3
6.	630217	Lab-II*	-	-	-	90	60	-	-	150	-	-	4	4
7.	630218	Self Learning / Presentation [§]	-	-	-	-	100	-	-	100	-	-	2	2
Total			280	80	40	90	160	25	75	750	15	-	6	21

Elective-II course will run through SWAYAM / NPTEL /MOOC based learning platform (with credit transfer facility).

Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. [This course may be run through SWAYAM/NPTEL based platform (with credit transfer facility) and accordingly, OC-2 pool may be created from the list of SWAYAM/NPTEL courses].

* During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

§ Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students bus assessment will be based on internal seminar presentation).

DE-2 (through SWAYAM / NPTEL /MOOC)	
Subject Code	Subject Name
630214	Data Science for Engineers
630215	Privacy and Security in Online Social Media
630216	Cloud Computing and Distributed System

OC-2	
Subject Code	Subject Name
800206	Introduction to Internet of Things
800207	Cloud Computing

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Department of Information Technology

M. Tech (Information Technology)

INTRODUCTION TO INTERNET OF THINGS
800206 (OC-2)

COURSE OBJECTIVES

- Introduction to IoT concepts and Market perspective.
 - Data and Knowledge Management and use of Devices in IoT Technology.
 - Understand State of the Art – IoT Architecture.
 - Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.
-

Unit I

Introduction to Internet of Things, Background, Monitoring and Controlling of things, IoT Reference Framework, IoT Architectures, Convergence of IT and OT, Mobile device explosion, Social network explosion, Digital Convergence/Transformation, Fast Rate of IoT Technology Adoption, Applications of IoT

Unit II

Sensors, Types of sensors, Actuators, Wearable electronics, Arduino board, Raspberry Pi, RFID, IoT Connectivity and Management, Telematics and Telemetry, Telematics vs IoT, M2M vs IoT, IoE, IIoT, V2V, V2X

Unit III

Internet & IoT protocols, LR-WPAN, Wimax, Zigbee, Z-Wave, IPv4, IPv6, 6LowPAN, MQTT, CoAP, AMQP, DDS, Websocket, Ethernet, WiFi, Bluetooth, InfraRed, IP Based Cellular Networks.

Unit IV

IoT Services Platform: Functions and Requirements, IoT Data Management and Analytics, Framework for distributed data analysis for IoT, Concept of Cloud computing & virtualization, Edge, Fog and Roof computing in IoT.

Unit V

IoT Vertical Markets and Connected Ecosystems: IoT Verticals, IoT Agriculture and Farming, IoT Energy Solutions, IoT Oil and Gas Solutions, IoT Smart Building

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Department of Information Technology

Solutions, IoT Finance, IoT Healthcare, IoT Industrial, IoT Transportation, IoT Challenges, Security, Privacy and Trust, Standardization gap

RECOMMENDED BOOKS

- Internet of Things from Hype to Reality, The Road to Digitization, Ammar Rayes and Samer Salam, Second Edition, Springer
 - Internet of Things (IoT) Technology, Economic View And Technical Standardization, Etienne Schneider, Version 1.0, ILNAS
 - Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies, Dimitrios Serpanos and Marilyn Wolf, Springer
 - Internet of Things Principles and Paradigms, Rajkumar Buyya, Elsevier
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain basic terminology of Internet of Things
 - CO2. to equip our students with the market perspective of IoT and have the knowledge of architectural overview of IoT.
 - CO3. identify and use various protocols devices that are used in IoT.
 - CO4. to be familiar with contemporary issues in IoT and Data and Knowledge Management and use of Devices in IoT Technology..
 - CO5. investigate challenges, security and privacy.
 - CO6. discuss different IoT enabled techniques behind interaction between things.
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Department of Information Technology

M. Tech (Information Technology)

CLOUD COMPUTING

800207 (OC-2)

COURSE OBJECTIVES

- To introduce the broad perceptive of cloud architecture and model.
 - To understand the concept of Virtualization.
 - To apply different cloud programming model as per need.
-

Unit- I

Cloud Architecture and Model: Technologies for Network-Based System, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics, Cloud Services, Cloud models, Public vs Private Cloud, Cloud Solutions Cloud ecosystem, Service management, Computing on demand.

Unit- II

Virtualization: Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices. Virtual Clusters and Resource management, Virtualization for Data-center Automation.

Unit- III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

Unit-IV

Programming Model: Parallel and Distributed Programming Paradigms- MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Mapping Applications, Programming Support, Google App Engine, Amazon AWS, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

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Unit -V

Security in the Cloud: Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security.

RECOMMENDED BOOKS

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers,2012.
 2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
 3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
 4. Kumar Saurabh, " Cloud Computing — insights into New-Era Infrastructure", Wiley India,2011
 5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
 6. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
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COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define various basic concepts related to cloud computing.
 - CO2. identify the architecture, infrastructure and delivery models of cloud computing.
 - CO3. apply suitable virtualization concept
 - CO4. choose the appropriate programming models and approach
 - CO5. analysis of various security issues in cloud computing.
 - CO6. compose virtualization, security and programming module in cloud computing solutions.
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Master of Technology (Information Technology) (Semester-III) Recommended W.E.F JULY 2020
Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
			Theory Slot			Practical Slot		MOOCs			L	T	P	
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation	Assignment	Exam					
1.	630311	Dissertation Part-I (Literature Review/ Problem Foundation/ Synopsis/survey paper, etc.)	-	-	-	150	100	-	-	250	-	-	10	10
2.	OC	MOOC Course*	-	-	-	-	-	25	75	100	-	-	02	02
Total			-	-	-	150	100	25	75	350	-	-	12	12

* MOOC course will be treated as the course of open nature and will be decided by concerning department / BoS.

MOOC Course
Introduction to Industry 4.0 and Industrial Internet of Things
Big Data Computing

WA