

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Details of courses focused on employability / entrepreneurship / skill development (Semester: Jan. – June 2021)

Courses Name	Course Code	Activities/Content which have a bearing on increasing skill and employability	Item No.	Page No.	Link of relevant documents / minutes
Social Networks	160851/900621	Handling Real-world Network Datasets and tools like Graph Theory, Sociology, Game Theory	01/02	02/03	https://drive.google.com/file/d/1-HdFMxWvBnDnc3qT9jIR_MhrvOW9ATRL/view?usp=sharing
Privacy and Security in Online Social Media	160852/900618	Data collection from social networks, challenges, opportunities, and pitfalls in online social networks	01/02	02/03,09	
Data Science for Engineers	900620	Mathematical foundations required for Data Science, Model Development and Assessment	02	03,09	
User-centric Computing for Human-Computer Interaction	IT0820H1	Engineering user-centric systems, User-centric computing, Computational user models (classical, contemporary), User-centric design evaluation	03	03	
Reinforcement Learning	IT0820H2	Various Bandit algorithms, Full RL & MDPs, Dynamic Programming & TD Methods	03	03,09	
Information Security-5-Secure Systems Engineering	IT0820H3	Various security vulnerabilities in software code, Preventing buffer overflow based malware, Integer overflow and buffer overread and heap overflow, Confinement.	03	03,09	
Foundations of Cryptography	IT0821M1	Basic paradigm and principles of modern cryptography, constructions of various cryptographic objects	03	04	
Introduction to Machine Learning	IT0821M2	Instance based learning, Feature reduction, Collaborative filtering based recommendation, Clustering, Neural network	03	04,09	
GPU Architectures and Programming	IT0620H2	GPU architecture basics. CUDA programming model. Architecture specific details like memory access coalescing, shared memory usage, GPU thread scheduling. OpenCL for both CPUs and GPUs	03	04	

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Introduction to Industry 4.0 and Industrial Internet of Things	IT0720H1	Transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics etc.	03	04,10
Design and analysis of algorithms	IT0621M1	Design and analysis of various algorithms such as Sorting, Search and Graphs, Design techniques: divide and conquer, greedy, dynamic etc.	03	04
Network & Web Security	160611	Conceptual understanding of network security principles, issues, challenges and mechanisms. Application of encryption techniques to secure data in transit across data networks, Exploration of real-time communication security and issues related to the security of web services.	04	04,16
Agile Methodology	160613	Agile approach to software development, Business value of adopting agile approaches, Agile development practices.	04	04,20
Cloud Computing	160614	Cloud architecture and model, Concept of Virtualization, Different cloud programming model.	04	04,22
Data Analytics with Python	160651	Various examples of analytics in a wide variety of industries, Hands-on experience creating various analytics models	05	05
Artificial Intelligence: Knowledge Representation And Reasoning	160654	Variety of representation formalisms and the associated algorithms for reasoning, Simple language of propositions, first order logic, and representations for reasoning about action, change, situations etc.	05	05

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Department of Information Technology

Details of New Course added

(Semester Jan. - June 21)

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Introduction to Machine Learning	IT0821M2	Instance based learning, Feature reduction, Collaborative filtering based recommendation, Clustering, Neural network	03	04,09	
Introduction to Internet of Things (IoT)	230101	IoT: Components, Applications, Hardware, Software, Protocols, Security and Challenges	09	74	
Introduction to Computer Programming	230102	Control Statements and Decision Making, Arrays, Strings & Pointers, Functions & Structures, File Handling	09	76	
Introduction to Artificial Intelligence	240101	Artificial Intelligence in Real World, Industrialization and its Impact, AI Tools for Implementation, Optimization, Machine Learning, Deep Learning	09	87	

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D No. MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR - 474005
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24.02.2021

**BOARD OF STUDIES (BoS) PROCEEDING
IN
COMPUTER SCIENCE & ENGINEERING
AND
INFORMATION TECHNOLOGY
(Meeting Dated - 28th November, 2020)**

Madhav Institute of Technology & Science, Gwalior-474 005

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

Department of CSE & IT

Minutes of Meeting of Board of Studies (BoS) in Computer Science & Engineering and Information Technology

Date 28/11/2020

The Meeting of Board of Studies (BoS) in Computer Science & Engineering and Information Technology (CSE & IT) was held on 28th November, 2020 at 11:30 A.M. Onwards through Video Conferencing. During the meeting following were present.

1.	Dr. Akhilesh Tiwari, Professor & Head, Department of CSE & IT, MITS, Gwalior (M.P.)	Chairman
2.	Dr. A. K. Solanki, Professor (Computer Science & Engineering), B.I.E.T. Jhansi (U.P.)	External Member (Academics) [Nominee of Hon'ble Vice Chancellor RGPV Bhopal]
3.	Dr. Nanhay Singh, Professor & Head, Department of Computer Science & Engineering, Netaji Subhas University of Technology (NSUT) (East Campus), Delhi (Formerly Ambedkar Institute of Advanced Communication Technologies and Research, Delhi)	External Member (Academics) [Nominee of Academic Council (AC), MITS Gwalior]
4.	Dr. Virendra Prasad Vishwakarma, Associate Professor, University School of Information and Communication Technology (USICT), Guru Gobind Singh Indraprastha University (GGSIPU), Delhi	External Member (Academics) [Nominee of Academic Council (AC), MITS Gwalior]
5.	Dr. Dinesh Kumar Vishwakarma, Associate Professor, Department of Information Technology, Delhi Technological University (DTU), Delhi	External Member (Academics) [Nominated by DTU Delhi under twinning arrangement of TEQIP-III]
6.	Dr. Nisha Chaurasia, Assistant Professor, Department of IT, Dr B R Ambedkar National Institute of Technology Jalandhar	External Member (Alumnus)
7.	Dr. R. K. Gupta, Professor	Member
8.	Dr. Manish Dixit, Professor	Member
9.	Ms. Khushboo Agarwal, Assistant Professor	Member
10.	Mr. Punit Kumar Johari, Assistant Professor	Member
11.	Dr. Sanjiv Sharma, Assistant Professor	Member
12.	Mr. Vikas Sejwar, Assistant Professor	Member
13.	Mr. Abhilash Sonker	Member
14.	Ms. Jaimala Jha, Assistant Professor	Member
15.	Mr. Jamvant Singh Kumare, Assistant Professor	Member
16.	Mr. Rajeev Kumar Singh, Assistant Professor	Member
17.	Ms. Neha Bhardwaj, Assistant Professor	Member

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Minutes of Meeting of Board of Studies (BoS) in CSE & IT held on 28th Nov. 2020

18.	Dr. R. R. Singh Makwana, Assistant Professor	Member
19.	Mr. Mahesh Parmar, Assistant Professor	Member
20.	Mr. Amit Kumar Manjhar, Assistant Professor	Member
21.	Dr. R. S. Jadon, Professor (Computer Application)	Member
22.	Dr. Anshu Chaturvedi, Professor (Computer Application)	Member
23.	Mrs. Parul Saxena, Assistant Professor (Computer Application)	Member

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

The following members could not attend the meeting:

1.	Dr. Kapil Sharma, Professor & Head, Department of Information Technology, Delhi Technological University (DTU), Delhi	External Member (Academics) [Nominated by DTU Delhi under twinning arrangement of TEQIP-III]
2.	Mr. Amitabh Shrivastava, Senior Consultant, TCS Noida	External Member (Industry)

The following deliberation took place in the meeting:

The minutes of previous meeting of Board of Studies (BoS) held on 30th May, 2020 (through video conferencing) were confirmed, followed by the item-wise discussion (as per the agenda of present BoS meeting), as follows

ITEM CSEIT-1:	<p>To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC based learning platform, to be offered in online mode under Departmental Elective (DE) category (with credit transfer), in the B.Tech VIII Semester (batch admitted in 2017-18), applicable during January-June 2021 academic session</p> <p>The list of Departmental Elective (DE-5) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform (in online mode) for B.Tech VIII Semester CSE & IT discipline (under flexible curriculum) were discussed and finalized, as per the following detail</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">DE-5 (B.Tech CSE/IT):</p> <ul style="list-style-type: none"> • Social Networks • Real Time Operating System • Reinforcement Learning </div> <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 (as and when desired) in line with the industrial need and emerging developments.</i></p>
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ITEM CSEIT-2:

To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC platform to be offered (for students of other departments) in online mode under Open Category (OC) courses (with credit transfer) in the VIII Semester (batch admitted in 2017-18) applicable during January-June 2021 academic session

The courses to be offered under Open Category (OC) Courses for B.Tech VIII Semester (for the students of other departments) to be offered from SWAYAM/NPTEL/MOOC based learning platforms (in online & offline mode) were discussed and recommended, as per the following detail

OC-4:	OC-5:
<ul style="list-style-type: none">• Introduction to Machine Learning• Introduction to Internet of Things• Software Testing	<ul style="list-style-type: none">• Deep Learning• Social Networks• Real Time Operating System

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 and availability of the courses on the SWAYAM/NPTEL/MOOC based learning platforms). Moreover, it is also discussed and proposed that the courses under Open Category (OC) may also be considered other than those available on SWAYAM/NPTEL/MOOC based learning platforms and the same can be offered in traditional teaching learning mode (if required). This will be determined by the department on the basis of emergent situation to cater the need of students.

ITEM CSEIT-3:

To propose the list of "Additional Courses" which can be opted for getting an
(i) Honours (for students of the host department)
(ii) Minor Specialization (for students of other departments)

[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the VI semester students (batch admitted in 2018-19) and for the VIII semester students (batch admitted in 2017-18)], applicable during January-June 2021 academic session

The courses available on SWAYAM/NPTEL/MOOC based learning platforms (to be offered under the provision for Honours and Minor Specialization) were discussed and recommended, as mentioned below

B.Tech VIII Semester (2017-18 admitted batch)
Additional Courses for "Honours" (Parent Department)
<ul style="list-style-type: none">• User-centric Computing for Human-Computer Interaction• Introduction to Parallel Programming in OpenMP• Privacy and Security in Online Social Media

	Additional Courses for "Minor Specialization" (Other Departments)					
	<ul style="list-style-type: none"> • Computer Organization and Architecture: A Pedagogical Aspect • Foundations of Cryptography • Privacy and Security in Online Social Media 					
	B.Tech VI Semester (2018-19 admitted batch)					
	Additional Courses for "Honours" (Parent Department)					
	<ul style="list-style-type: none"> • GPU Architectures and Programming • Privacy and Security in Online Social Media • Artificial Intelligence: Knowledge Representation and Reasoning 7 					
	Additional Courses for "Minor Specialization" (Other Departments)					
	<ul style="list-style-type: none"> • Design and Analysis of Algorithms • Programming, Data Structures and Algorithms using Python • Programming in Java 					
	In continuation, it is discussed that the above list must be kept dynamic and additional courses may be inducted (as per the requirement)					
ITEM CSEIT-4:	<p>To review and finalize the list and syllabi for all Departmental Elective (DE) Courses of VI Semester (to be offered to the batch admitted in 2018-19) under the flexible curriculum along with their COs : {applicable during January-June 2021 academic session}</p> <p>The courses to be offered under Departmental Elective (DE) category (in offline mode) for B.Tech. VI Semester CSE / IT discipline (under flexible curriculum) were discussed and recommended, as per the following detail</p> <table border="1" data-bbox="422 1116 1286 1302"> <tr> <td>DE-1 (B.Tech CSE):</td> <td>DE-1 (B.Tech IT):</td> </tr> <tr> <td> <ul style="list-style-type: none"> • Network & Web Security • Cloud Computing • Mobile Computing </td> <td> <ul style="list-style-type: none"> • Network & Web Security • Cloud Computing • Agile Methodology </td> </tr> </table> <p><i>It is further discussed that the above mentioned list of courses may be expanded (if required) to accommodate the industrial demand and emerging technological advancements in the field.</i></p> <p>The syllabi of Courses along with their Course Outcomes (COs) is Annexed as Annexure-I</p>		DE-1 (B.Tech CSE):	DE-1 (B.Tech IT):	<ul style="list-style-type: none"> • Network & Web Security • Cloud Computing • Mobile Computing 	<ul style="list-style-type: none"> • Network & Web Security • Cloud Computing • Agile Methodology
DE-1 (B.Tech CSE):	DE-1 (B.Tech IT):					
<ul style="list-style-type: none"> • Network & Web Security • Cloud Computing • Mobile Computing 	<ul style="list-style-type: none"> • Network & Web Security • Cloud Computing • Agile Methodology 					

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ITEM CSEIT-5:	<p>To review and finalize the list of Courses from SWAYAM/NPTEL/MOOC based learning platforms (to be offered to batch admitted in 2018-19) in online mode under Departmental Elective (DE) Courses (with credit transfer) in the VI Semester {applicable during Jan -June 2021 academic session}</p> <p>The list of Departmental Elective (DE-2) courses to be offered from SWAYAM/NPTEL/MOOC based learning platforms with credit transfer (in online mode) for B.Tech. VI Semester CSE & IT discipline (under flexible curriculum) were discussed and recommended, as per the following detail</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;"><u>DE-2 (B.Tech CSE / IT):</u></p> <ul style="list-style-type: none"> Data Analytics with Python Introduction to Machine Learning Deep Learning </div> <p>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 must be included (as per the need and recent developments).</p>						
ITEM CSEIT-6:	<p>To review and finalize the Courses & Syllabi to be offered (for the batch admitted in 2018-19) under the Open Category (OC) Courses for VI semester students of other departments along with their COs</p> <p>The courses to be offered under Open Category (OC) Courses for B.Tech. VI Semester (for the students of other departments) were discussed and recommended as per the following detail</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Offered by CSE Department</th> <th style="width: 50%; text-align: center;">Offered by IT Department</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><u>OC-1:</u></td> <td style="text-align: center;"><u>OC-1:</u></td> </tr> <tr> <td> <ul style="list-style-type: none"> Python Programming Data Structures </td> <td> <ul style="list-style-type: none"> Software Engineering Data Mining & Warehousing </td> </tr> </tbody> </table> <p>Further, considering the fact that the Open Category (OC) courses are meant only for the students of other departments, it is discussed and recommended that the above list of courses may be changed / expanded (as per the need and demand from other departments). Moreover, the department may offer any of the courses from the mentioned list.</p> <p>The detailed syllabi (along with their COs) is Annexed as Annexure-II</p>	Offered by CSE Department	Offered by IT Department	<u>OC-1:</u>	<u>OC-1:</u>	<ul style="list-style-type: none"> Python Programming Data Structures 	<ul style="list-style-type: none"> Software Engineering Data Mining & Warehousing
Offered by CSE Department	Offered by IT Department						
<u>OC-1:</u>	<u>OC-1:</u>						
<ul style="list-style-type: none"> Python Programming Data Structures 	<ul style="list-style-type: none"> Software Engineering Data Mining & Warehousing 						
ITEM CSEIT-7:	<p>To review and finalize the Courses & Syllabi to be offered (to the batch admitted in 2018-19) under Departmental Core (DC) Courses for the VI semester students along with their Cos</p> <p>The Syllabi of all the Departmental Core (DC) Courses, to be offered during VI Semester (B.Tech. CSE / IT Programme) along with their COs under flexible curriculum were discussed and recommended. The same is enclosed as Annexure-III.</p>						

ITEM CSEIT-8:	<p>To review and finalize the Courses & Syllabi to be offered (to the batch admitted in 2019-20) under Departmental Core (DC) Courses for the IV semester students along with their COs</p> <p>The Syllabi of all the Departmental Core (DC) Courses, to be offered during IV Semester (B.Tech. CSE / IT Programme) along with their COs under flexible curriculum were discussed and recommended. The same is enclosed as Annexure-IV.</p>
ITEM CSEIT-9:	<p>To review and finalize the Scheme Structure & Syllabi (of I & II semester) of the existing B Tech programmes in CSE /IT discipline and newly introduced B.Tech. programmes in emerging areas [effective from the batch admitted in 2020-21 academic session]</p> <p>The Scheme Structure & Syllabi (of I & II Semester) of following B.Tech programmes were discussed, finalized and recommended</p> <ul style="list-style-type: none"> • B.Tech (Computer Science & Engineering) • B.Tech (Information Technology) <p><u>Newly introduced programmes</u></p> <ul style="list-style-type: none"> • B.Tech Internet of Things (IoT) • B.Tech. Information Technology (Artificial Intelligence and Robotics) <p>The Scheme Structure & syllabi (along with their COs) is Annexed as Annexure-V, VI, VII and VIII.</p>
ITEM CSEIT-10:	<p>To identify gaps in CO attainment levels for Jan. - June 2020 semester and propose corrective measures for improvement</p> <p>The attainment level of Course Outcomes (COs) for all the courses pertaining to Jan. -June 2020 semester was presented. In continuation, it is discussed that the courses (if any) where the set target value has not been attained, should be critically analyzed to identify the difficulty level and other causes. The analysis must be followed by corrective measures, such as arrangement of extra / remedial classes, proper coverage of COs in Question Paper and interaction with the students for possible improvement.</p> <p>The same is Annexed as Annexure-IX</p>
ITEM CSEIT-11:	<p>To prepare and propose the equivalence list of courses for B. Tech programmes (for 2017-18, 2018-2019, 2019-2020 & the 2020 admitted batch)</p> <p>The equivalence list of courses for B. Tech programmes (for 2017-18, 2018-2019, 2019-2020 & the 2020-21 admitted batch) were presented before the house. The same is enclosed as Annexure-X.</p>

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<p>ITEM CSEIT-12:</p>	<p>(a) To propose and recommend the panel of examiners for PG dissertation viva voce examination</p> <p>The panel of examiner(s) for PG dissertation viva voce examination was discussed and recommended. The same is enclosed as Annexure-XI.</p> <p>(b) To review the syllabi of Data Structures and Algorithms (to be offered during the First Semester of Master in Computer Application (MCA) programme w.e.f. 2020-21 Academic Session (applicable during Jan.-June 2020 semester).</p> <p>The syllabus of Data Structures and Algorithms (Departmental Core Course of MCA First Semester) was reviewed. The same is finalized and recommended with slight changes and content reorientation. The recommended syllabus is Annexed as Annexure-XII.</p> <p>(c) To finalize the course/subject codes pertaining to the schemes of various programmes.</p> <p>It is decided that the course / subject codes must be followed as per the prevailing mechanism of the institute.</p>
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The meeting ended with the vote of thanks to all the members.



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



DEAN (ACADEMICS)
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***List of Courses Finalized after Review
and Post BoS Meeting Discussion
for Jan.-June 2021 semester
(effective for B.Tech VIII and VI semester to
be offered in offline and online mode)
Under Flexible Curriculum***

For batch admitted in Academic Session 2017-18

LIST OF COURSES (Through SWAYAM/NPTEL)(VIII SEMESTER)

8 SEM (Jan- June 2021)	OC-4 (2 credit)	Privacy and Security in Online Social Media (8 Weeks (in 12 weeks Duration)) Introduction to internet of things (12 Weeks)
	OC-5 (2 credit)	Data Science for Engineers (8 Weeks) Social Networks (12 Weeks)

8 SEM (Jan- June 2021)	DE-5 (2 credit)	Social Networks (12 Weeks) Privacy and Security in Online Social Media (8 Weeks (in 12 weeks Duration))

Honors (VIII) (Jan-June 2021)		User-centric Computing for Human-Computer Interaction (8 Weeks)
		Reinforcement Learning (12 Weeks)
		Information Security - 5 - Secure Systems Engineering (8 Weeks)

Minor (VIII) (Jan-June 2021)		Foundations of Cryptography (12 Weeks)
		Introduction to Machine Learning (12 Weeks)

For batch admitted in Academic Session 2018-19

LIST OF COURSES (VI SEMESTER)

6 SEM (Jan- June 2021)	OC-1 (offline Mode)	Software Engineering (offered by IT)
		Data Mining & Warehousing (offered by IT)
		Data Structures (offered by CSE)
		Python Programming (offered by CSE)
6 SEM (Jan- June 2021)	DE-1 (offline Mode)	Network & Web Security
		Cloud Computing
	DE-2 (online Mode) (4 credits)	Agile Methodology (for IT) / Mobile Computing (for CSE)
		Data Analytics with Python (12 Weeks)
		Introduction to Machine Learning (12 Weeks)
		Artificial Intelligence: Knowledge Representation And Reasoning (12 Weeks)
Honors (VI) (Jan- June 2021)	GPU Architectures and Programming (12 Weeks)	
	Privacy and Security in Online Social Media (8 Weeks(in 12 weeks Duration))	
	Introduction to Industry 4.0 and Industrial Internet of Things (12 Weeks)	
Minor (VI) (Jan-June 2021)	Design and analysis of algorithms	
	Programming, Data Structures And Algorithms Using Python	
	Programming in Java	

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

B.Tech. VIII Semester (Computer Science & Engineering) for batch admitted in Academic Session 2017-18

S. No.	Subject Code	Category	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. Exam	Quiz/Assignment	End Sem. & Sessional	Assignment	Exam						
1.	DE	DE	Departmental Elective* (DE-5)	-	-	-	-	25	-	75	2	-	-	2	
2.	OC	OC	Open Category* (OC-4)	-	-	-	-	25	-	75	2	-	-	2	
3.	OC	OC	Open Category* (OC-5)	-	-	-	-	25	-	75	2	-	-	2	
4.	150801	DLC	Internship/Project (DLC-9)	-	-	-	150	-	-	-	-	-	-	6	3
5.	150802	-	Professional Development ^g	-	-	-	50	-	-	-	-	-	-	2	1
Total				-	-	-	250	200	75	225	6	8	10		

Additional Courses for obtaining Honours or minor Specialization by desirous students

^aAll of these courses will run through SWAYAM/NPTEL/ MOOC

^bEvaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs and technical events)

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

Scheme of Examination
B.Tech. VIII Semester (Information Technology)


for batch admitted in Academic Session 2017-18

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits		
				Theory Slot		Practical Slot Lab Work & Sessional	MOOCs		L	T		P					
				End Sem. Exam	Mid Sem. Exam		Quiz/Assignment	End Sem.					Assignment	Exam			
1.	DE	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	-	25	75	2	-	-	2	
2.	OC	OC	Open Category* (OC-4)	-	-	-	-	-	-	-	25	75	2	-	-	2	
3.	OC	OC	Open Category* (OC-5)	-	-	-	-	-	-	-	25	75	2	-	-	2	
4.	160801	DLC	Internship/Project (DLC-9)	-	-	-	250	150	-	-	-	-	400	-	-	6	3
5.	160802	-	Professional Development ^d	-	-	-	-	50	-	-	-	-	50	-	-	2	1
Total				-	-	-	250	200	75	225	6	8	750	6	-	8	10

Additional Courses for obtaining Honours or minor Specialization by desirous students

*All of these courses will run through SWAYAM/NPTEL/MOOC

^d Evaluation will be based on participation/laurels brought by the students in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs and technical events)


 DEAN (ACADEMICS)
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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

Scheme of Examination
B. Tech. VI Semester (Computer Science & Engineering)

For batches admitted in Academic Session 2018-19 Onwards (w.e.f. July, 2018)

S. No.	Subject Code	Category Code	Subject Name	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/Assign ment	End Sem.						Lab work & Sessional	Assign ment
1.	150601	DC	Compiler Design (DC-12)	70	20	10	30	20	-	-	150	2	1	2	4
2.	150602	DC	Computer Networks (DC-13)	70	20	10	-	-	-	-	100	4	-	-	4
3.	150603	DE	DE-1	70	20	10	-	-	-	-	100	4	-	-	4
4.	150604	DE	DE-2*	-	-	-	-	-	25	75	100	4	-	-	4
5.	150605	OC	OC-1	70	20	10	-	-	-	-	100	2	1	-	3
6.	100007	MC-4	Disaster Management	70	20	10	-	-	-	-	100	3	-	-	3
7.	150606	DLC-5	Minor Project-II	-	-	-	50	50	-	-	100	-	-	4	2
Total				350	100	50	80	70	25	75	750	19	2	6	24

Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester

Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

* This courses must be run through SWAYAM/NPTEL/ MOOC

DE -I (Through Traditional Mode)			OC-1		
S. No.	Subject Code	Subject Name	S. No.	Subject Code	Subject Name
1.	150611	Network & Web Security	1.	900106	Data Structures
2.	150613	Mobile Computing	2.	900107	Python Programming
3.	150614	Cloud Computing			

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

MDE

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

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination
B. Tech. VI Semester (Information Technology)

For batches admitted in Academic Session 2018-19 Onwards (w.e.f. July, 2018)

S.No.	Subject Code	Category Code	Subject Name	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/Assign ment	End Sem.						Lab work & Sessional	Assign ment
1.	160601	DC	Compiler Design (DC-12)	70	20	10	30	20	-	-	2	1	2	4	
2.	160602	DC	Computer Networks (DC-13)	70	20	10	-	-	-	-	4	-	-	4	
3.	160603	DE	Departmental Elective (DE-1)	70	20	10	-	-	-	-	4	-	-	4	
4.	160604	DE	Departmental Elective* (DE-2)	-	-	-	-	-	25	75	4	-	-	4	
5.	160605	OC	Open Category (OC-1)	70	20	10	-	-	-	-	2	1	-	3	
6.	100007	MC	Disaster Management (MC)	70	20	10	-	-	-	-	3	-	-	3	
7.	160606 160603	DLC	Minor Project-II (DLC-5)	-	-	-	50	50	-	-	-	-	4	2	
Total				350	100	50	80	70	25	75	750	19	2	6	24
Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester															
Additional Course for Honours or minor Specialization		Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization													

* This courses must be run through SWAYAM/NPTEL/MOOC

DE -1 (Through Traditional Mode)	
S. No.	Subject Code
1.	160611 ✓
2.	160613 ✓
3.	160614 ✓

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

OC-1		
S. No.	Subject Code	Subject Name
1.	900108	Software Engineering
2.	900116	Data Mining & Warehousing

DE-2. (Through Shreyam)
1. Data Analytics with Python 160651
2. Introduction to Machine Learning 160652
3. AI: Knowledge Representation 160653
and Reasoning 160654

M.D.

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

Syllabi of
Departmental Elective (DE-1) Courses
B.Tech VI Semester
(Computer Science & Engineering /
Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -4]

NETWORK & WEB SECURITY
150611/ 160611 (DE-1)

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 Stream 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 Policies.

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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, 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 Prosis, 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.
-

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MOBILE COMPUTING
150613 (DE-1)

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.

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- Mobile & Personnel Communication Systems and Services, Raj Pandya, Prentice Hall India.
 - 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.
-

AGILE METHODOLOGY
160613 (DE-1)

COURSE OBJECTIVES

- To understand the background and driving forces for taking an agile approach to software development.
 - To understand the business value of adopting agile approaches.
 - To understand the agile development practices.
-

Unit -I

Fundamentals of Agile: The Genesis of Agile, Introduction and Background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven Development, Lean Software, Development, Agile Project Management, Design and Development Practices in Agile Projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

Unit- II

Agile Scrum Framework: Introduction to Scrum, Project Phases, Agile Estimation, Planning Game, Product Backlog, Sprint Backlog, Iteration Planning, User Story Definition, Characteristics and Content of User Stories, Acceptance Tests and Verifying Stories, Project Velocity, Burn Down Chart, Sprint Planning and Retrospective, Daily Scrum, Scrum Roles – Product Owner, Scrum Master, Scrum Team, Scrum Case Study, Tools for Agile Project Management.

Unit- III

Agile Testing: Agile Lifecycle and its Impact on Testing, Test-Driven Development (TDD), Xunit Framework and Tools for TDD, Testing User Stories - Acceptance Tests and Scenarios, Planning and Managing Testing Cycle, Exploratory Testing, Risk Based Testing, Regression Tests, Test Automation, Tools to Support Agile Tester.

Unit- IV

Agile Software Design and Development: Agile Design Practices, Role of Design Principles Including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle

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in Agile Design, Need and Significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated Build Tools, Version Control.

Unit -V

Industry Trends: Market scenario and Adoption of Agile, Agile ALM, Roles in Agile Project, Agile applicability, Agile in Distributed Teams, Business Benefits, Challenges in Agile, Risks and Mitigation, Agile Projects on Cloud, Balancing Agility with Discipline, Agile Rapid Development Technologies.

RECOMMENDED BOOKS

- Agile Software Development with Scrum, Ken Schwaber, Mike Beedle, Pearson.
 - Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin, Janet Gregory, Addison Wesley.
 - Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
 - Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.
 - User Stories Applied: For Agile Software, Mike Cohn, Addison Wesley.
-

COURSE OUTCOMES

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

- CO1. demonstrate scrum release planning, and scrum sprint planning.
 - CO2. apply user stories into tasks and ideal day estimates.
 - CO3. classify a sprint with sprint reviews and sprint retrospectives.
 - CO4. examine the scrum with multiple team or distributed project teams.
 - CO5. design test driven and agile principal based software.
 - CO6. develop any application using agile methodology.
-

CLOUD COMPUTING
150614/ 160614(DE-1)

COURSE OBJECTIVES

- To introduce the broad perceptives 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.

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.

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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.
-

Annexure-II

*Syllabi of
Open Category (OC) Courses
B.Tech VI Semester
(Computer Science & Engineering /
Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -6]*

DATA STRUCTURES
900106 (OC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their Characteristics, Asymptotic Notations. Arrays and its Representations, Index to Address Translation. **Linked List:** Introduction, Implementation of Linked List, Operations, Circular Linked List, Doubly Linked List, Polynomial Manipulation using Linked List.

Unit-II

Stacks: Concepts and Implementation of Stacks, Operations on Stack, Conversion of Infix to Postfix Notation, Evaluation of Postfix Expression, Recursion.

Queues: Concepts and Implementation, Operations on Queues, Dequeue, Priority Queues, Circular Queues and Application.

Unit-III

Trees: Types, Terminology, Binary Tree -Representations, Traversal, Conversion of General Tree to Binary Tree, Binary Search Tree, Threaded Binary Tree and Height Balanced Tree.

Unit-IV

Graphs: Background, Graph Theory Terminologies, Representation of Graphs- Sequential & Linked Representation, Path Matrix, Graph Traversals- BFS, DFS, Spanning Trees, Applications of Graph.

Unit-V

Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort and Heap Sort, Comparison between Sorting Techniques, Hashing and Collision Resolution Techniques.

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RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
 - An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
 - Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.
-

COURSE OUTCOMES

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

- CO1. outline the basics of algorithms and their performance criteria.
 - CO2. explain the working of linear/non-linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various data structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

PYTHON PROGRAMMING
900107 (OC-1)

COURSE OBJECTIVES

- To understand the structure and components of a python program.
 - To learn the basic construct of python programming for implementing interdisciplinary research-based problems.
 - To plot data using appropriate python visualization libraries for analysis.
-

Unit I

Introduction to Python: Setting Up Programming Environment, Running Python Programs from a Terminal, Variables and Simple Data Types: Variables, Strings, Numbers and Maths, Comments, Conditional Statements, Introducing Loops, Working of Input Function.

Unit II

Tuples and Lists: Tuples, Lists, List Operations, Using If Statements with Lists, Organizing a List, Working with Lists: Looping through Entire List, Making Numeric Lists, Working with Part of List. **Dictionaries and Sets:** Simple Dictionary, Looping Through a Dictionary, Nesting, Example with a Dictionary, Fibonacci and Dictionaries, Global Variables, Defining a Set, Set Operations.

Unit III

Functions: Defining a Function, Passing Arguments, Return Values, Passing a List, Passing an Arbitrary Number of Arguments, Storing Functions in Module, In- Built Functions, Lambda Functions. **Classes and Inheritance:** Object Oriented Programming, Creating and using a Class, Working with Class Instances, Methods, Inheritance, Importing Classes, Python Standard Library.

Unit IV

Files and Exceptions: Reading from a File, Writing to a File, File Operations, Assertions, Exceptions, Exception example. **Debugging:** Programming Challenges, Classes of Tests, Bugs, and Debugging, Debugging examples.

Unit V

Data Visualization: Installing Matplotlib, Plotting a Simple Line Graph, Random Walks, Making Histogram. **Graphical User Interfaces:** Event-Driven Programming

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Paradigm; Tkinter Module, Creating Simple GUI; Buttons, Labels, Entry Fields, Dialogs;
Widget Attributes - Sizes, Fonts, Colors, Layouts, Nested Frames.

RECOMMENDED BOOKS

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes.
 - Learn Python the Hard Way: 3rd Edition.
 - T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
 - Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.
-

COURSE OUTCOMES

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

- CO1. explain the numbers, math, functions, strings, list, tuples and dictionaries in python.
 - CO2. apply different decision-making statements and functions.
 - CO3. identify the object-oriented programming in python.
 - CO4. analyze the different file handling operations.
 - CO5. design GUI applications in python and evaluate different database operations.
 - CO6. develop client-server network applications using python.
-

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SOFTWARE ENGINEERING
900108 (OC-1)

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), 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 Management- Basics-People, Product, Process, Project, Estimation- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code

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(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 & cost 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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Department of Computer Science & Engineering and Information Technology

DATA MINING & WAREHOUSING

(OC-1)

COURSE OBJECTIVES

- To understand the significance of data mining in real-world perspective.
 - To gain understanding of data mining techniques, algorithms and commonly used tools.
 - To develop ability for applying data mining techniques and tools for solving real-world problems.
-

Unit - I

Introduction: Motivation, important, Data type for Data Mining: Relational Databases, Data Ware-Houses. Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining.

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, Emerging Scenario of Pattern Warehousing System.

Unit - III

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization.

Unit - IV

Mining Association Rules in Large Databases: 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, other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

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Unit - V

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
 - Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.
-

COURSE OUTCOMES

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

- CO1. explain various data mining tasks.
 - CO2. classify various databases systems and data models / schemas of data warehouse.
 - CO3. compare various methods for storing & retrieving data from different data sources/repository.
 - CO4. apply pre-processing techniques for construction of data warehouse.
 - CO5. analyze data for knowledge discovery & prediction using appropriate algorithms.
-

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Annexure-III

Syllabi of
Departmental Core (DC) Courses
B.Tech VI Semester
(Computer Science & Engineering /
Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -7]

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COMPILER DESIGN 150601/160601 (DC-12)

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
 - To learn, various phases of compiler
 - To understand process of compiler implementation.
-

Unit-I

Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation, String Allocation, Structure Allocation etc., Error Detection Indication and Recovery, Routines or Printing Various Lexical, Syntax and Semantic Errors.

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Unit-V

Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Code Improving Transformations, Dealing with Aliases, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
 - Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.
-

COURSE OUTCOMES

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

- CO1. define the concepts of finite automata and context free grammar.
 - CO2. build the concept of working of compiler.
 - CO3. examine various parsing techniques and their comparison.
 - CO4. compare various code generation and code optimization techniques.
 - CO5. analyze different tools and techniques for designing a compiler.
 - CO6. design various phases of compiler.
-

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COMPUTER NETWORKS
150602/160602 (DC-13)

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- 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 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.
-

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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B.Tech. IV Semester (Computer Science & Engineering)
Scheme of Examination

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	Total					
				70	20	10	-	20						
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	100	2	2	-	4	
2.	150401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	150	2	1	2	4	
3.	150402	DC	Database Management System (DC-6)	70	20	10	30	20	150	2	1	2	4	
4.	150403	DC	Operating System (DC-7)	70	20	10	-	-	100	3	1	-	4	
5.	150404	DC	Computer System Organization (DC-8)	70	20	10	-	-	100	3	1	-	4	
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3	
7.	150405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	50	-	-	6	3	
Total				420	120	60	90	60	750	14	7	10	26	
				NSS/NCC										
				Qualifier										
Summer Internship Project-II (Softskills Based) for two weeks duration: Evaluation in V Semester														

*Virtual Lab to be conducted along with the traditional lab

Scheme of Examination
B.Tech. IV Semester (Information Technology)

For batches admitted in Academic Session 2018-19 Onwards (w.e.f. July, 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted				Total Marks			Contact Hours per week			Total Credits
				Theory Slot		Practical Slot		End Sem.	L	T	P			
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.					Term work Lab Work & Sessional		
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	2	2	-	4		
2.	160401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	2	1	2	4		
3.	160402	DC	Database Management System (DC-6)	70	20	10	30	20	2	1	2	4		
4.	160403	DC	Operating System (DC-7)	70	20	10	-	-	3	1	-	4		
5.	160404	DC	Computer System Organization (DC-8)	70	20	10	-	-	3	1	-	4		
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	2	1	-	3		
7.	160405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	-	-	6	3		
Total				420	120	60	90	60	14	7	10	26		
NSS/NCC				Qualifier										
				Summer Internship Project-II (Soft skills Based) for two weeks-duration: Evaluation in V Semester										

*Virtual Lab to be conducted along with the traditional lab

*Syllabi of
Departmental Core (DC) Courses
B.Tech IV Semester
(Computer Science & Engineering /
Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -8]*

DESIGN & ANALYSIS OF ALGORITHMS
150401/160401 (DC-5)

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: RAM, Turing machine, Circuit model, PRAM, Bulk synchronous parallel (BSP) 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:** Binary Search Trees, Height Balanced Trees, B-Trees and Traversal Techniques.

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.

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.

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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. tell the basic features of an algorithm.
 - CO2. demonstrate a familiarity with major algorithms and data structures.
 - CO3. apply important algorithmic design paradigms and methods of analysis.
 - CO4. analyze the asymptotic performance of algorithms.
 - CO5. compare different design techniques to develop algorithms for computational problems.
 - CO6. design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.
-

DATABASE MANAGEMENT SYSTEM
150402/160402 (DC-6)

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 modeling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Concepts & Architecture, Introduction of File organization Techniques, Database Approach v/s Traditional File Approach, Advantages of Database System, Schemas, Instances, Data Independence, Functions of DBA, Entities & Attributes, Entity types, Value Sets, Key Attributes, Relationships, E-R Diagram.

Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Unit-II

Relational Data Models: Domains, Tuples, Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints.

Query Languages: Relational Algebra & Relational Calculus, Relational Algebra operations like Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Unit-III

SQL: Data Definition, Data Manipulation in SQL, Update Statements & Views in SQL Query & Subquery, Query by Example Data Storage Definition, Data Retrieval Queries, Set Operations, Aggregate functions, Nested sub queries, Data Manipulation Statements etc. Overview of Tuple Oriented & Domain Oriented Relational Calculus & Operations.

Unit-IV

Database Design: Introduction to Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Attribute closure, Decomposition, Dependency

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Preservation, Loss Less & Lossy Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Processing Concepts: Introduction, State Diagram, Properties of Transaction, Types of Transaction, Serializability: Conflict and View Serializability, Concurrency Control: Concepts, Techniques, Concurrent operation of Databases, Recovery: Introduction, Types of Recovery.

Overview of Distributed Databases: Protection, Security & Integrity Constraints. Relational Database Management Systems: Oracle & Microsoft Access Tools. Basic Concepts of Object Oriented Database System & Design.

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 successful completion of the course students will be able to:

- CO1. tell the terminology, features, classifications, and characteristics embodied in database systems.
 - CO2. explain different issues involved in the design and implementation of database system.
 - CO3. apply transaction processing concepts and recovery methods over real time data.
 - CO4. analyze database schema for a given problem domain.
 - CO5. justify principles for logical design of databases, including the e-r method and normalization approach.
 - CO6. formulate, using relational algebra and sql, solutions to a broad range of query problems.
-

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OPERATING SYSTEM
150403/160403 (DC-7)

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. **File System Interface:** The Concept of a File, Access

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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 of operating system.
 - CO3. develop the solution of various operating system problems/issues.
 - CO4. analyze the various operating system problems/issues.
 - CO5. measure the performance of various scheduling/allocation approaches.
 - CO6. test the working of various scheduling/allocation approaches.
-

COMPUTER SYSTEM ORGANIZATION
150404/160404 (DC-8)

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.
-

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Annexure-V

Scheme & Syllabi
of
B. Tech I & II Semester
(Computer Science & Engineering)
Under Flexible Curriculum
[ITEM CSEIT -9]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

GROUP Y: I Semester

B. Tech. I Semester (Computer Science & Engineering)


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
				Theory Slot		Practical Slot Lab work / Sessional	End Sem.	Quiz/Assignment	End Sem.		L	T	P	
				End Sem.	Mid Sem.									
1.	230102	DC	Introduction to Computer Programming	60	20	20	20	60	40	2	1	2	4	
2.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	20	60	40	2	1	2	4	
3.	100020	ESC	Basic Civil Engineering & Mechanics	60	20	20	20	60		2	1	-	3	
4.	100021	ESC	Basic Mechanical Engineering	60	20	20	20	60		2	1	-	3	
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	20	60		3	-	-	3	
6.	150111	DLC	IT workshop	-	-	-	-	60	40	-	-	4	2	
Total				300	100	100	100	180	120	11	04	08	19	
Induction Programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.														
NSS / NCC										Qualifier				

GROUP X: (Civil, Mechanical, Electrical, Chemical, and Automobile)

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

01 Theory Period=1 Credit; 02 Practical Periods =1 Credit


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

MF

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination
GROUP Y: II Semester
B. Tech. II Semester (Computer Science & Engineering)

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
				Theory Slot		Practical Slot		Total Marks	L	T	P			
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.					Lab work / Sessional		
1.	100011	BSC	Engineering Mathematics - I	60	20	20	-	-	100	3	1	-	4	
2.	150211	DC	Data Structures	60	20	20	60	40	200	2	1	2	4	
3.	150212	DC	Object Oriented Programming & Methodology	60	20	20	60	40	200	3	-	2	4	
4.	150213	DC	Digital Electronics	60	20	20	-	-	100	2	1	-	3	
5.	100016	HSMC	Technical Language	60	20	20	-	-	100	3	-	-	3	
6.	100017	HSMC	Language Lab	-	-	-	60	40	100	-	-	2	1	
Total				300	100	100	180	120	800	13	03	06	19	
Summer Internship Project - I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.														
NSS / NCC														
Qualifier														

GROUP X: (Civil, Mechanical, Electrical, and Automobile)

GROUP Y: (Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication, Chemical)

01 Theory Period = 1 Credit; 02 Practical Periods = 1 Credit

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

WJ

INTRODUCTION TO COMPUTER PROGRAMMING
230102

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
 - To familiar with debugging process.
 - To design and implement basic programming solutions including statements, control structures, and methods.
-

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

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Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
 - Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
 - Yashavant Kanetkar, Let Us C, BPB publication.
 - E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
 - Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: identify situations where computational methods and computers would be useful.
 - CO2: describe the basic principles of imperative and structural programming.
 - CO3: develop a pseudo-code and flowchart for a given problem.
 - CO4: analyze the problems and choose suitable programming techniques to develop solutions.
 - CO5: design, implement, debug and test programs.
 - CO6: design computer programs to solve real world problems.
-

DATA STRUCTURES
150211 (DC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations, arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

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Unit-V

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

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

- CO1. outline the basics of Algorithms and their performance criteria's.
 - CO2. explain the working of linear/Non Linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various Data Structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
150212 (DC-2)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of Oops, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

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Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

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

- CO1. tell the concepts of classes & objects and their significance in real world.
 - CO2. explain the benefits of object oriented design.
 - CO3. build C++ classes using appropriate encapsulation and design principles.
 - CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.
 - CO5. choose appropriate object orient programming concepts for solving real world problems.
 - CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
-

DIGITAL ELECTRONICS
150213 (DC-3)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
 - To learn various number systems, boolean algebra and logic gates.
 - To understand the concept of counters, latches and flip-flops.
-

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
 - CO2. recall different number system and solve the basic arithmetic operations.
 - CO3. develop the understanding of combinational circuits.
 - CO4. analyze the basic concept of sequential circuits.
 - CO5. compare various memories.
 - CO6. solve the boolean functions using logic gates.
-

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Annexure-VI

Scheme & Syllabi
of
B. Tech I & II Semester
(Information Technology)
Under Flexible Curriculum
[ITEM CSEIT -9]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

GROUP Y: I Semester

B. Tech. I Semester (Information Technology)

For batches admitted in academic session 2020-21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted				Practical Slot Lab work / Sessional	Total Marks	Contact Hours per Week			Total Credits
				Theory Slot		End Sem.	End Sem.			L	T	P	
				End Sem.	Mid Sem.								
1.	230102	DC	Introduction to Computer Programming	60	20	20	60	40	200	2	1	2	4
2.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	40	200	2	1	2	4
3.	100020	ESC	Basic Civil Engineering & Mechanics	60	20	20			100	2	1	-	3
4.	100021	ESC	Basic Mechanical Engineering	60	20	20			100	2	1	-	3
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20			100	3	-	-	3
6.	160111	DLC	IT workshop	-	-	-	60	40	100	-	-	4	2
Total				300	100	100	180	120	800	11	04	08	19
Induction Programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.													
NSS / NCC													
Qualifier													
GROUP X: (Civil, Mechanical, Electrical, Chemical, and Automobile)													
GROUP Y: (Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)													
01 Theory Period=1 Credit; 02 Practical Periods =1 Credit													


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Scheme of Examination

GROUP Y: II Semester

B. Tech. II 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
				Theory Slot		Practical Slot		End Sem.	End Sem.	Lab work / Sessional	L	T	P	
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.							
1.	100011	BSC	Engineering Mathematics - I	60	20	20	-	-	100	3	1	-	4	
2.	160211	DC	Data Structures	60	20	20	60	40	200	2	1	2	4	
3.	160212	DC	Object Oriented Programming & Methodology	60	20	20	60	40	200	3	-	2	4	
4.	160213	DC	Digital Electronics	60	20	20	-	-	100	2	1	-	3	
5.	100016	HSMC	Technical Language	60	20	20	-	-	100	3	-	-	3	
6.	100017	HSMC	Language Lab	-	-	-	60	40	100	-	-	2	1	
Total				300	100	100	180	120	800	13	03	06	19	
Summer Internship Project - I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.														
NSS / NCC														
GROUP X: (Civil, Mechanical, Electrical, and Automobile) GROUP Y: (Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication, Chemical) 01 Theory Period = 1 Credit; 02 Practical Periods = 1 Credit														

Qualifier

MT

M.D.
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INTRODUCTION TO COMPUTER PROGRAMMING
230102

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
 - To familiar with debugging process.
 - To design and implement basic programming solutions including statements, control structures, and methods.
-

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

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Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
 - Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
 - Yashavant Kanetkar, Let Us C, BPB publication.
 - E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
 - Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: identify situations where computational methods and computers would be useful.
 - CO2: describe the basic principles of imperative and structural programming.
 - CO3: develop a pseudo-code and flowchart for a given problem.
 - CO4: analyze the problems and choose suitable programming techniques to develop solutions.
 - CO5: design, implement, debug and test programs.
 - CO6: design computer programs to solve real world problems.
-

DATA STRUCTURES
160211 (DC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations, arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

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Unit-V

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
 - An Introduction to Data Structures with Applications, Jean-Paul Tremblay, McGraw Hill.
 - Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.
-

COURSE OUTCOMES

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

- CO1. outline the basics of Algorithms and their performance criteria's.
 - CO2. explain the working of linear/Non Linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various Data Structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
160212 (DC-2)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
 - To create C++ programs that leverage the object oriented features of the C++ Language.
 - To apply object oriented or non-object oriented techniques to solve bigger computing problems.
-

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of OOPS, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

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Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

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

- CO1. tell the concepts of classes & objects and their significance in real world.
 - CO2. explain the benefits of object oriented design.
 - CO3. build C++ classes using appropriate encapsulation and design principles.
 - CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.
 - CO5. choose appropriate object orient programming concepts for solving real world problems.
 - CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
-

DIGITAL ELECTRONICS
160213 (DC-3)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
 - To learn various number systems, boolean algebra and logic gates.
 - To understand the concept of counters, latches and flip-flops.
-

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
 - CO2. recall different number system and solve the basic arithmetic operations.
 - CO3. develop the understanding of combinational circuits.
 - CO4. analyze the basic concept of sequential circuits.
 - CO5. compare various memories.
 - CO6. solve the boolean functions using logic gates.
-

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Annexure-VII

Scheme & Syllabi
(I & II Semester)
of
NEW B. Tech. Programme
(Internet of Things (IoT)).
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination B.Tech. in Internet of Things (IoT) (Offered by Department of Information Technology)

I 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
				Theory Slot		Practical Slot		L		T	P		
				End Sem.	Mid Sem Exam.	Quiz/Assignment	End Sem.					Lab work & Sessional	
1.	230101	DC	Introduction to Internet of Things (IoT)	60	20	20	-	-	100	4	-	-	4
2.	230102	DC	Introduction to Computer Programming	60	20	20	60	40	200	2	1	2	4
3.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	40	200	2	1	2	4
4.	250100	BSC	Linear Algebra	60	20	20	-	-	100	3	1	-	4
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	-	100	3	-	-	3
Total				300	100	100	120	80	700	14	03	04	19
Qualifier													
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													

MF

Signature

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Scheme of Examination

B.Tech. in Internet of Things (IoT) (Offered by Department of Information Technology)
II Semester

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.						Quiz/ Assignment	
1.	230201	DC	Digital Logic Design	60	20	20	-	100	2	1	-	3
2.	220202	DC	Sensor Technology	60	20	20	60	200	3	-	2	4
3.	230202	DC	Data Structures	60	20	20	60	200	3	-	2	4
4.	230203	DC	Object Oriented Programming and Methodology	60	20	20	60	200	3	-	2	4
5.	100016	HSMC	Technical Language	60	20	20	-	100	3	-	-	3
6.	100017	HSMC	Language Lab	-	-	-	60	100	-	-	2	1
Total				300	100	100	240	900	14	1	8	19
NSS/NCC				Qualifier								
Summer Internship Project -I (Institute Level) (Qualifier): Minimum two-week duration (Evaluation in III Semester)												


 DEAN (ACADEMICS)
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INTRODUCTION TO INTERNET OF THINGS (IoT)
230101 (DC)

COURSE OBJECTIVES

- To understand basic terminology of Internet of Things.
 - To understand technology behind interaction between things.
 - To understand basic terminology of Internet of Things.
-

Unit I

Internet of things (IoT) : Introduction, Evaluation of IoT concept, Definition, Key features and components, IoT Building block, IoT Characteristics, Advantages and Disadvantages.

Unit II

IoT Applications, IoT application structures and driver technologies : collection, transmission, processing, managing, utilization phase, Telematics and Telemetry, Telematics vs IoT, Machine-to-Machine communication, M2M vs IoT, IoE, IIoT, V2V, V2X.

Unit III

IoT hardware and software, Study of IoT Sensors, Actuators, Wearable electronics, Standard devices, Concept of Cloud, Edge, Fog and Roof computing in IoT, Introduction to communication, Components of communication system, Modes of communication, Types of data transmission, IoT communication models : Device-to-Device, Device-to-Cloud, Device-to-Gateway, and Back-End Data-Sharing, IoT Connectivity and Management.

Unit IV

Introduction to Internet and Networking Protocol, IoT protocols, Types of IoT Networks, Introduction of WSN, RF wireless sensors, RFID, WiFi, Bluetooth, IP Based Cellular Networks & 3G, 4G.

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Unit V

IoT Challenges: Interoperability, Precision, Data volume and scalability, Internet connectivity, **IoT Security:** Security vulnerabilities in overall IoT system, Security vulnerabilities at different layers of IoT architecture, IoT 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
 - Data Communications and Networking, Behrouz A Forouzan, Fourth Edition, McGraw Hill Education
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: explain basic terminology of Internet of Things.
 - CO2: illustrate the role of communication in IoT.
 - CO3: identify and use various protocols devices that are used in IoT.
 - CO4: classify networking, cloud and fog computing concept for data management.
 - CO5: investigate challenges, security and privacy.
 - CO6: discuss different IoT enabled techniques behind interaction between things.
-

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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INTRODUCTION TO COMPUTER PROGRAMMING
230102 (DC)

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
 - To familiar with debugging process.
 - To design and implement basic programming solutions including statements, control structures, and methods.
-

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

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Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
 - Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
 - Yashavant Kanetkar, Let Us C, BPB publication.
 - E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
 - Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: identify situations where computational methods and computers would be useful.
 - CO2: describe the basic principles of imperative and structural programming.
 - CO3: develop a pseudo-code and flowchart for a given problem.
 - CO4: analyze the problems and choose suitable programming techniques to develop solutions.
 - CO5: design, implement, debug and test programs.
 - CO6: design computer programs to solve real world problems.
-

DIGITAL LOGIC DESIGN
230201 (DC)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
 - To learn various number systems, boolean algebra and logic gates.
 - To understand the concept of counters, latches and flip-flops.
-

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
 - Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
 - CO2. recall different number system and solve the basic arithmetic operations.
 - CO3. develop the understanding of combinational circuits.
 - CO4. analyze the basic concept of sequential circuits.
 - CO5. compare various memories.
 - CO6. solve the boolean functions using logic gates.
-

DATA STRUCTURES
230202 (DC)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations. arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

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Unit-V

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
 - An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
 - Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.
-

COURSE OUTCOMES

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

- CO1. outline the basics of Algorithms and their performance criteria's.
 - CO2. explain the working of linear/Non Linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various Data Structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
230203 (DC)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
 - To create C++ programs that leverage the object oriented features of the C++ Language.
 - To apply object oriented or non-object oriented techniques to solve bigger computing problems.
-

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of OOPS, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

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Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

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

- CO1. tell the concepts of classes & objects and their significance in real world.
 - CO2. explain the benefits of object oriented design.
 - CO3. build C++ classes using appropriate encapsulation and design principles.
 - CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.
 - CO5. choose appropriate object orient programming concepts for solving real world problems.
 - CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
-

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Annexure-VII

Scheme & Syllabi
(I & II Semester)
of
NEW B. Tech. Programme
Information Technology (Artificial
Intelligence and Robotics)
Under Flexible Curriculum


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

Scheme of Examination
B.Tech. in Information Technology (Artificial Intelligence and Robotics)
 (Offered by Department of Information Technology)

I 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
				Theory Slot		Practical Slot			L	T	P	
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.					
1.	240101	DC	Introduction to Artificial Intelligence	60	20	20	-	-	4	-	-	4
2.	230102	DC	Introduction to Computer Programming	60	20	20	60	40	2	1	2	4
3.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	40	2	1	2	4
4.	250100	BSC	Linear Algebra	60	20	20	-	-	3	1	-	4
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	-	3	-	-	3
Total				300	100	100	120	80	14	3	04	19
				Qualifier								
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												



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



Scheme of Examination
B.Tech. in Information Technology (Artificial Intelligence and Robotics)
 (Offered by Department of Information Technology)

II Semester

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted				Practical Slot Lab work & Sessional	Total Marks	Contact Hours per week				Total Credits
				Theory Slot		Quiz/ Assignment	End Sem.			L	T	P		
				End Sem.	Mid Sem.									
1.	230201	DC	Digital Logic Design	60	20	20	-	100	2	1	-	3		
2.	220202	DC	Sensor Technology	60	20	20	60	200	3	-	2	4		
3.	230202	DC	Data Structures	60	20	20	60	200	3	-	2	4		
4.	230203	DC	Object Oriented Programming and Methodology	60	20	20	60	200	3	-	2	4		
5.	100016	HSMC	Technical Language	60	20	20	-	100	3	-	-	3		
6.	100017	HSMC	Language Lab	-	-	-	60	100	-	-	2	1		
Total				300	100	100	240	900	14	1	8	19		
NSS/NCC				Qualifier										
Summer Internship Project - I (Institute Level) (Qualifier): Minimum two-week duration (Evaluation in III Semester)														


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



INTRODUCTION TO ARTIFICIAL INTELLIGENCE
240101 (DC)

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basic representation and reasoning paradigms used in AI.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

Unit I

Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II

Conventional Vs Machine Learning Programming , Data/Information/Knowledge, Type of Data: Structure, Non Structure, Semi Structure, Images, Video, Temporal, Real Time, etc, Data Types: Categorical/Nominal/Ordinal, Etc..., Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III

Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification. Introduction to Optimization: Evolutionary Algorithms, Genetic Algorithms: Basic Concepts, Optimization, Need for Optimization, Membership Functions.

Unit IV

Introduction to Intelligent Agent, Characteristics and functionalities, Introduction to Expert System, Roles of Expert Systems, Logic and Reasoning in AI: Introduction to Logic, Basic

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of Boolean Algebra, Logic Gates, Propositional and Predicate Logic: Interpretation of Formulas, Syntax and Semantics of an Expression, Inference Rules.

Unit V

Artificial Intelligence in Real World: Speech Processing, Natural Language Processing, Planning, Engineering and Expert Systems, Fuzzy Systems, Models of Brain and Evolution, AI in Healthcare, Defence and Agriculture, Cyber Security, Agriculture, E-Commerce, Gaming, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
 - Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: define basic concepts of Artificial Intelligence.
 - CO2: relate various computer components used in Artificial Intelligence.
 - CO3: identify different logical and reasoning techniques used in AI.
 - CO4: analyze the general approach of optimization, intelligent agent and expert system.
 - CO5: analyze the general approach of machine learning.
 - CO6: build AI enabled intelligent procedures for solving real world problems.
-

INTRODUCTION TO COMPUTER PROGRAMMING
230102 (DC)

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
 - To familiar with debugging process.
 - To design and implement basic programming solutions including statements, control structures, and methods.
-

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

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Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
 - Paul Deitel and Harvey M. Deitel, How to Program, Pearson Publication.
 - Yashavant Kanetkar, Let Us C, BPB publication.
 - E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
 - Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1: identify situations where computational methods and computers would be useful.
 - CO2: describe the basic principles of imperative and structural programming.
 - CO3: develop a pseudo-code and flowchart for a given problem.
 - CO4: analyze the problems and choose suitable programming techniques to develop solutions.
 - CO5: design, implement, debug and test programs.
 - CO6: design computer programs to solve real world problems.
-

DIGITAL LOGIC DESIGN
230201 (DC)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
 - To learn various number systems, boolean algebra and logic gates.
 - To understand the concept of counters, latches and flip-flops.
-

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
 - CO2. recall different number system and solve the basic arithmetic operations.
 - CO3. develop the understanding of combinational circuits.
 - CO4. analyze the basic concept of sequential circuits.
 - CO5. compare various memories.
 - CO6. solve the boolean functions using logic gates.
-

DATA STRUCTURES
230202 (DC)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
 - To understand various techniques of searching and sorting.
 - To understand basic concepts about stacks, queues, lists, trees and graphs.
-

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations. arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

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Unit-V

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
 - An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
 - Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.
-

COURSE OUTCOMES

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

- CO1. outline the basics of Algorithms and their performance criteria's.
 - CO2. explain the working of linear/Non Linear data structures.
 - CO3. identify the appropriate data structure to solve specific problems.
 - CO4. analyze the performance of various Data Structures & their applications.
 - CO5. evaluate the time/space complexities of various data structures & their applications.
 - CO6. design the optimal algorithmic solutions for various problems.
-

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OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
230203 (DC)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of Oops, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

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Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

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

- CO7. tell the concepts of classes & objects and their significance in real world.
 - CO8. explain the benefits of object oriented design.
 - CO9. build C++ classes using appropriate encapsulation and design principles.
 - CO10. analyze the utilization of inheritance and polymorphism in the solution of problems.
 - CO11. choose appropriate object orient programming concepts for solving real world problems.
 - CO12. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
-

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Annexure-IX

*Gaps in CO Attainment Levels
for
Session Jan-June 2020 semester
and
Proposed Corrective Measures for Improvement
(Computer Science & Engineering /
Information Technology)
[ITEM CSEIT -10]*

CO Attainment of B. Tech. Computer Science & Engineering
 (Session: Jan-June 2020 Semester)

Course Name	Course outcomes	CO Attainment %	Target	Gap	Action Taken
150401: Design and Analysis of Algorithm	CO1 Tell the basic features of an Algorithms	78.67	65	0	Conducted Extra practice sessions
	CO2 Demonstrate a familiarity with major Algorithms and Data Structures	88	65	0	
	CO3 Apply important algorithmic design paradigms and methods of analysis	77.33	65	0	
	CO4 Analyze the asymptotic performance of Algorithms	78.67	65	0	
	CO5 Compare different design techniques to develop algorithms for computational problems.	86.67	65	0	
	CO6 Design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking, branch and bound approach.	58.67	65	6.33	
150402: Database management system	CO1 Tell the terminology, features, classifications, and characteristics embodied in database systems	92	70	0	No action needed
	CO2 Explain different issues involved in the design and implementation of database system	86.67	70	0	
	CO3 Apply transaction processing concepts and recovery methods over real time data.	86.67	70	0	
	CO4 Analyze database schema for a given problem domain.	93.33	70	0	
	CO5 Justify principles for logical design of databases, including the E-R method and normalization approach.	88	70	0	
	CO6 Formulate, using relational algebra and SQL, solutions to a broad range of query problems.	85.33	70	0	
150403: Operating system	CO1 Outline the basic concept of operating systems	62.67	60	0	Conducted Extra classes and tutorial classes
	CO2 Analyze the working of operating system	64	60	0	
	CO3 Examine the working of various scheduling/allocation approaches	81.33	60	0	
	CO4 Measure the performance of various scheduling/allocation approaches	57.33	60	2.67	
	CO5 Compare the various operating system problems/issues	54.67	60	5.33	
	CO6 Develop the Solution of various operating system problems/issues	32	60	28	
Computer Organization	CO1 Recall the basic building blocks of computer Architecture	100	70	0	No action needed
	CO2 Compare different memories.	96	70	0	
	CO3 Apply the concept of memory mapping, multiprocessor and pipelining in solving real world	98.67	70	0	

CO Attainment of B. Tech. Computer Science & Engineering
 (Session: Jan-June 2020 Semester)

Course Name	Course outcomes	CO Attainment %	Target	Gap	Action Taken
150404: System C	CO4 Analyze various modes of Input-Output data transfer.	92	70	0	
	CO5 Evaluate the arithmetic related to the number system.	96	70	0	
	CO6 Develop the skill of writing low level programming.	82	70	0	
	CO1 Tell the basic terminologies of cyber security	85.33	70	0	
	CO2 Explain the basic concepts of Networking and Internet	92	70	0	
	CO3 Apply various methods used to protect data in the internet environment in real world situations	86.67	70	0	No action needed
100004: Cyber Security	CO4 Discover the Concepts of IP security and Architecture	87.67	70	0	
	CO5 Compare various types of Cyber Security Threats/ Vulnerabilities	90.67	70	0	
	CO6 Develop the understanding of Cyber Crime Investigation and IT Act 2000	89.33	70	0	
	CO1 Recall the concepts of finite automata and context free grammar	76	65	0	
	CO2 Build the concept of working of compiler	65.33	65	0	
	CO3 Examine various parsing techniques and their comparison	70.67	65	0	
150601: Compiler Design	CO4 Compare various code generation and code optimization techniques.	76	65	0	No action needed
	CO5 Analyze different tools and techniques for designing a compiler	69.33	65	0	
	CO6 Design various phases of compiler	76	65	0	
	CO1 Explain the fundamental concepts of Computer Networks.	73.33	70	0	
	CO2 Illustrate the basic taxonomy & terminologies of computer network protocols.	74.67	70	0	
	CO3 Develop a concept for understanding advance computer network.	74.67	70	0	
150602: Computer Networks	CO4 Build the skill of IP addressing and routing mechanism	76	70	0	No action needed
	CO5 Predict the performance of computer network in congestion and Internet.	69.33	70	0.67	
	CO6 Construct the network environment for implementation of computer networking concept.	80	70	0	
	CO1 explain the basic concepts of mobile telecommunications system.	96	70	0	
	CO2 demonstrate the infrastructure to develop mobile communications system	98.67	70	0	
	CO3 classify the different generations and technology for mobile communications.	100	70	0	

CO Attainment of B. Tech. Computer Science & Engineering
 (Session: Jan-June 2020 Semester)

Course Name	Course outcomes	CO Attainment %	Target	Gap	Action Taken	
Semester 6	150613: Mobile Computing	CO4	98.67	70	0	No action needed
		CO5				
		CO6	96	70	0	
		CO1	92	70	0	
		CO2	78.67	60	0	
		CO3	88	60	0	
160611: Network and Web security	CO4	80	60	0	No action needed	
	CO5	65	60	0		
	CO6	62.67	60	0		
	CO1	62.67	60	0		
	CO2					
	CO3					
900106: DATA STRUCTURE	CO4	96	70	0	No action needed	
	CO5	96	70	0		
	CO6	94.67	70	0		
	CO1	96	70	0		
	CO2	96	70	0		
	CO3	96	70	0		
900107 (OC): Python Programming	CO4	82	60	0	No action needed	
	CO5	81.5	60	0		
	CO6	76.3	60	0		
	CO1	65.33	60	0		
	CO2	85	60	0		
	CO3	61.33	60	0		
900107 (OC): Python Programming	CO4	66.67	60	0	No action needed	
	CO5	66.67	60	0		

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 Department of Computer Science & Engineering and Information Technology

CO Attainment of B. Tech. Computer Science & Engineering
 (Session: Jan-June 2020 Semester)

Course Name	Course outcomes	CO Attainment %	Target	Gap	Action Taken	
BCSL801: Image Processing	CO3 Apply image processing techniques to enhance visual images.	66.67	60	0	Given extra assignments to students	
	CO4 Analyze the constraints in image processing when dealing with real problems	66.67	60	0		
	CO5 Evaluate various enhancement, restoration and retrieval techniques of image processing	61.33	60	0		
	CO6 Design a system using mathematical models and principle of digital image processing for real world problems	58.67	60	1.33		
	CO1 Tell various methods for storing & retrieving data from different data sources /repository.	56	60	4		
	CO2 Classify various data bases and data models of data warehouse.	61.33	60	0		
BCSL802: Data Warehouse and data Mining	CO3 Apply pre-processing techniques for construction of data warehouse	52	60	8	Detailed analysis of conducted Quizzes and assignments. Also, Conducted extra classes	
	CO4 Analyze data mining algorithms for knowledge discovery & prediction.	66.67	60	0		
	CO5 Choose appropriate data mining method for finding of association rules from transactional databases.	48	60	12		
	CO6 Develop various classification algorithms for data using data mining.	45.33	60	14.67		
	CO1 Explain the concept of Artificial Neural Network and Fuzzy Logic.	64	60	0		
	CO2 Illustrate various problems to be solved through Fuzzy Systems.	54.67	60	5.33		
BCSL803: Neural Network and Fuzzy systems	CO3 Make use of single and multi-layer feed-forward neural networks.	61.33	60	0	Conducted extra classes	
	CO4 Analyze various Neural Networks in order to solve problems effectively and efficiently.	57.33	60	2.67		
	CO5 Determine the roll of Neural Networks & Fuzzy Systems in problem solving.	61.33	60	0		
	CO6 Develop and train different supervised and unsupervised networks.	32	60	28		

Semester8

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 Department of Computer Science & Engineering and Information Technology

CO Attainment of B. Tech. Computer Science & Engineering
 (Session: Jan-June 2020 Semester)

Course Name	Course outcomes	CO Attainment %	Target	Gap	Action Taken
BCSL804: Internet of Things and Applications	CO1 Explain internet of things, evolution of IoT, applications of IoT	64	65	1	Detailed analysis of conducted Quizzes and assignments with the students.
	CO2 classify IoT architecture, IoT service life cycle and application of device/cloud collaboration	66.67	65	0	
	CO3 Apply the concept of IoT in real world scenario	64	65	1	
	CO4 Analyse security and privacy in the IoT	60	65	5	
	CO5 choose appropriate framework for distributed data analysis for IoT and anomaly detection	65.33	65	0	
	CO6 develop small low cost embedded systems	66.67	65	0	

**CO Attainment of B. Tech. Information Technology
 (Session: Jan-June 2020 Semester)**

Course Name	Course outcomes	CO Attainment %	Target	Gap	Action Taken
160401: Design and Analysis of Algorithm	CO1 Tell the basic features of an Algorithms	100	65	0	
	CO2 Demonstrate a familiarity with major Algorithms and Data Structures	66.67	65	0	
	CO3 Apply important algorithmic design paradigms and methods of analysis	100	65	0	
	CO4 Analyze the asymptotic performance of Algorithms	100	65	0	
	CO5 Compare different design techniques to develop algorithms for computational problems.	100	65	0	No action needed
	CO6 Design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking, branch and bound approach.	66.67	65	0	
160402: Database management system	CO1 Demonstrate the concepts of different type of database system.	84	65	0	
	CO2 Apply Relational algebra concepts to design database system.	92	65	0	
	CO3 Make use of queries to design and access database system.	84	65	0	
	CO4 Analyze the evaluation of transaction processing and concurrency control.	85.33	65	0	
	CO5 Determine the optimize database for real world applications.	65.33	65	0	Discussed extra Tutorial-sheets
	CO6 Design a database system for a real world application.	53.33	65	11.67	
160403: Operating system	CO1 Outline the basic concept of operating systems	72	70	0	
	CO2 Analyze the working of operating system	70	70	0	
	CO3 Examine the working of various scheduling/allocation approaches	71.22	70	0	
	CO4 Measure the performance of various scheduling/allocation approaches	65	60	0	
	CO5 Compare the various operating system problems/issues	69	60	0	
	CO6 Develop the Solution of various operating system problems/issues	57	60	3	Conducted Extra practice sessions
160404: Computer System Organization	CO1 Demonstrate the computer architecture for defining basic component and functional unit.	85	70	0	
	CO2 Recall different number system and solve the basic arithmetic operations of signed and unsigned numbers.	84	70	0	
	CO3 Develop the fundamental concept to understand the working of microprocessor.	87	70	0	
	CO4 Explain the basic concept of input output organization.	84	70	0	No action needed
	CO5 Compare various memory and mapping techniques.	89	70	0	

**CO Attainment of B. Tech. Information Technology
 (Session: Jan-June 2020 Semester)**

Course Name	Course outcomes	CO % Attainment	Target	Gap	Action Taken
S	CO6	70	70	0	
	CO1	85.33	70	0	
	CO2	92	70	0	
	CO3	86.67	70	0	
	CO4	87.67	70	0	No action needed
	CO5	90.67	70	0	
10004: Cyber Security	CO6	89.33	70	0	
	CO1	80	65	0	
	CO2	86.67	65	0	
	CO3	86.67	65	0	
	CO4	77.33	65	0	Detailed analysis of conducted Quizzes and assignments with the students
	CO5	60	65	5	
160601: Compiler Design	CO6	54.67	65	10.33	
	CO1	97.33	60	0	
	CO2	97.33	60	0	
	CO3	93.33	60	0	
	CO4	64	60	0	Conducted extra classes
	CO5	62.67	60	0	
160602: Computer Networks	CO6	30.67	60	29.33	
	CO1	64.91	60	0	
	CO2	71.93	60	0	
	CO3				
	CO4				
	CO5				

**CO Attainment of B. Tech. Information Technology
 (Session: Jan-June 2020 Semester)**

Course Name	Course outcomes	CO Attainment %	Target	Gap	Action Taken	
160602: A Methodol	CO3	Classify a Sprint with Sprint Reviews and Sprint Retrospectives	60	0	No action needed	
	CO4	Examine the Scrum with multiple team or distributed project teams.	60	0		
	CO5	Design test driven and agile principle based software.	70.18	0		
	CO6	Develop any application using agile methodology.	68.42	0		
	CO1	Explain cryptographic algorithms, hash algorithms and authentication mechanisms.	92	60		0
	CO2	Illustrate fundamentals of number theory, attacks and security principles.	92	60		0
160611: Network and Web security	CO3	Apply number theory and various algorithms to achieve principles of security.	60	0	Conducted Extra sessions on Tutorial problems	
	CO4	Analyze the cause for various existing network attacks and describe the working of available security controls	58.67	60		1.33
	CO5	Examine the vulnerabilities in IT infrastructure.	57.33	60		2.67
	CO6	Predict the attacks and controls associated with IP, transport-level, web and e-mail security.	57.33	60		2.67
	CO1	Explain different modalities and current techniques in image acquisition.	66.67	60		0
	CO2	Classify spatial and frequency domain techniques in image processing.	66.67	60		0
BITL801: Image Processing	CO3	Apply image processing techniques to enhance visual images.	60	0	Extra Tutorial-sheets given to students with solutions	
	CO4	Analyze the constraints in image processing when dealing with real problems	66.67	60		0
	CO5	Evaluate various enhancement, restoration and retrieval techniques of image processing	61.33	60		0
	CO6	Design a system using mathematical models and principle of digital image processing for real world problems	58.67	60		1.33

**CO Attainment of B. Tech. Information Technology
 (Session: Jan-June 2020 Semester)**

Course Name	Course outcomes	CO Attainment %	Target	Gap	Action Taken	
Semester 8	BITTL802: Data Warehouse and data Mining	CO1	56	60	4	Conducted Extra classes and tutorial classes
		CO2	61.33	60	0	
		CO3	52	60	8	
		CO4	66.67	60	0	
		CO5	48	60	12	
		CO6	45.33	60	14.67	
BITTL803: Neural Network and Fuzzy systems	CO1	64	60	0	Conducted extra classes	
	CO2	54.67	60	5.33		
	CO3	61.33	60	0		
	CO4	57.33	60	2.67		
BITTL804: Internet of Things and Applications	CO5	61.33	60	0	Detailed analysis of conducted Quizzes and assignments. Also, Conducted extra classes	
	CO6	32	60	28		
	CO1	66.67	60	0		
	CO2	62.67	60	0		
	CO3	56	60	4		
	CO4	64	60	0		
BITTL804: Internet of Things and Applications	CO5	62.67	60	0	Detailed analysis of conducted Quizzes and assignments. Also, Conducted extra classes	
	CO6	36	60	24		

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Department of CSE/IT

EQUIVALENCE LIST

B.E./B.Tech

Annexure-X

*Equivalence list
of Courses for*

B. Tech Programme(s)

(for 2017-18, 2018-2019, 2019-2020 & the 2020 admitted batch)

*(Computer Science & Engineering /
Information Technology)*

[ITEM CSEIT -II]

Department of CSE/IT
EQUIVALENCE LIST
B.E./B.Tech

Semester: VIII and Year: IV

S.No.	Code(s)	Subject	Branches in which the question paper is applicable
1.	BCSL801/BITL801	Image Processing	CSE/IT
2.	BCSL802/ BITL802/CSL802/ITL 802/8Y52	Data Warehouse and Data Mining	CSE/IT
3.	BCSL803/BITL803/CSL803/ITL 804/ 8553	Neural Networks & Fuzzy Systems	CSE/IT
4.	BCSL804/BITL804	Internet of Things & Applications	CSE/IT
5.	CSL801/8Y51	Advance Operating Systems	CSE/IT
6.	CSL804/ITL 801/8Y71	Cellular and Mobile Communication	CSE/IT

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EQUIVALENCE LIST
B.E./B.Tech

Semester: VII and Year: IV

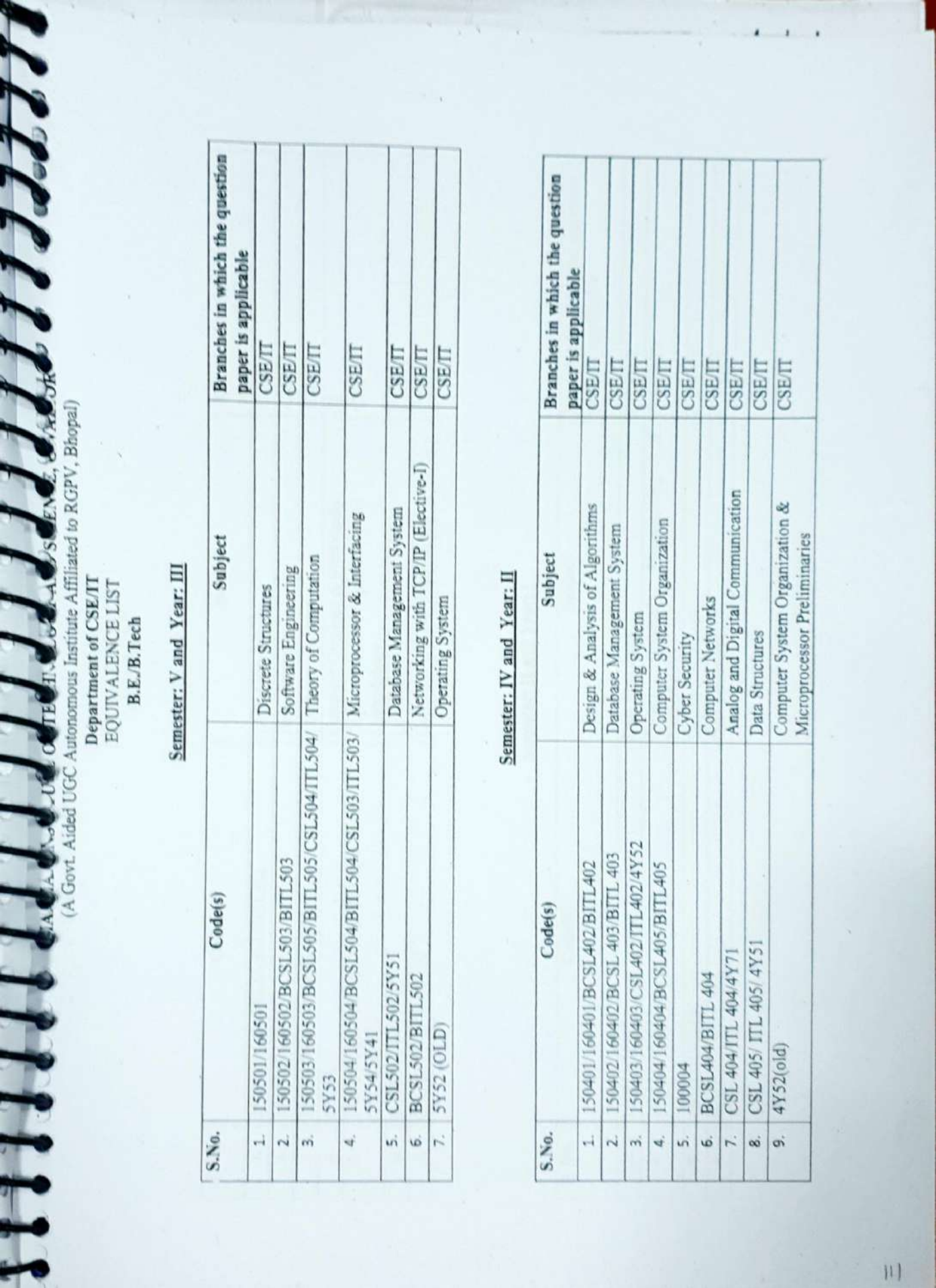
S.No.	Code(s)	Subject	Branches in which the question paper is applicable
1.	150711/160711(DE-3)/CSL704/ITL704/7Y71	Networking with TCP/IP	CSE/IT
2.	150712/160712(DE-3)	Data Mining & Warehousing	CSE/IT
3.	150713/BCSL702/BITL702	Distributed Systems	CSE/IT
4.	160713(DE-3)	Software Testing	IT
5.	900208(OC-2)	Soft Computing	Open Category
6.	900209(OC-2)	Network Security	Open Category
7.	900210(OC-2)	Data Mining & Warehousing	Open Category
8.	900220(OC-3)	R Programming	Open Category
9.	900221(OC-3)	Artificial Intelligence	Open Category
10.	900222(OC-3)	Computer Networks	Open Category
11.	BCSL701/BITL701/CSL701/ITL701/7Y51	Artificial Intelligence & Expert Systems	Open Category
12.	BCSL703	Digital Forensics	CSE/IT
13.	BITL703	IT Infrastructure Management	CSE
14.	BCSL704/BITL704	Adhoc Network	IT
15.	BCSL705/BITL705	E-Commerce	CSE/IT
16.	CSL702/ITL702/7Y52	Compiler Design & Translator	CSE/IT
17.	CSL703/ITL703/7Y53	Parallel Processing	CSE/IT
18.	CSL705/ITL705/7Y72	Internet Technology & web Designing	CSE/IT

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EQUIVALENCE LIST
B.E./B.Tech

Semester: VI and Year: III

S.No.	Code(s)	Subject	Branches in which the question paper is applicable
1.	150601/160601/BCSL604/ BITL604	Compiler Design	CSE/IT
2.	150602/160602	Computer Networks	CSE/IT
3.	150611/160611/BCSL605/BITL605/CSL605/ITL605/6Y55	Network & Web Security	CSE/IT
4.	150612/160612	Image Processing	CSE/IT
5.	150613	Mobile Computing	CSE
6.	160613	Agile Methodology	IT
7.	900106	Data Structure	Open Category
8.	900107	Python Programming	Open Category
9.	900108/CSL604/ITL604/6Y54	Software Engineering	Open Category /CSE/IT
10.	BCSL610/BITL610	Cloud Computing (Elective-II)	CSE/IT
11.	BCSL602/ BITL602	Mobile Computing	CSE/IT
12.	BCSL603/BITL603	Software Project Management	CSE/IT
13.	BITL 609 /ITL601/6771	Information Theory & Coding (Elective -II)	CSE/IT
14.	CSL601/6551	Analysis & Design of Algorithms	CSE/IT
15.	CSL602/ ITL602/6Y52	Computer Graphics & Multimedia	CSE/IT
16.	CSL603/ ITL603/6Y53	Data Communication	CSE/IT
17.	CSL604/ ITL604/6Y54	Software Engineering	CSE/IT
18.	6555	System Programming	CSE



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EQUIVALENCE LIST
B.E./B.Tech

Semester: V and Year: III

S.No.	Code(s)	Subject	Branches in which the question paper is applicable
1.	150501/160501	Discrete Structures	CSE/IT
2.	150502/160502/BCSL503/BITL503	Software Engineering	CSE/IT
3.	150503/160503/BCSL505/BITL505/CSL504/ITL504/5Y53	Theory of Computation	CSE/IT
4.	150504/160504/BCSL504/BITL504/CSL503/ITL503/5Y54/5Y41	Microprocessor & Interfacing	CSE/IT
5.	CSL502/ITL502/5Y51	Database Management System	CSE/IT
6.	BCSL502/BITL502	Networking with TCP/IP (Elective-I)	CSE/IT
7.	5Y52 (OLD)	Operating System	CSE/IT

Semester: IV and Year: II

S.No.	Code(s)	Subject	Branches in which the question paper is applicable
1.	150401/160401/BCSL402/BITL402	Design & Analysis of Algorithms	CSE/IT
2.	150402/160402/BCSL403/BITL403	Database Management System	CSE/IT
3.	150403/160403/CSL402/ITL402/4Y52	Operating System	CSE/IT
4.	150404/160404/BCSL405/BITL405	Computer System Organization	CSE/IT
5.	100004	Cyber Security	CSE/IT
6.	BCSL404/BITL404	Computer Networks	CSE/IT
7.	CSL404/ITL404/4Y71	Analog and Digital Communication	CSE/IT
8.	CSL405/ITL405/4Y51	Data Structures	CSE/IT
9.	4Y52(old)	Computer System Organization & Microprocessor Preliminaries	CSE/IT

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Department of CSE/IT

EQUIVALENCE LIST

B.E./B. Tech

Semester: III and Year: II

S. No.	Code(s)	Subject	Branches in which the question paper is applicable
1.	150301/160301/BCSL302/BITL302	Digital Electronics	CSE/IT
2.	150302/160302	Data Structures	CSE/IT
3.	150303/BCSL304/BITL304/	Computer Graphics	CSE/IT
4.	160303	Computer Graphics & Multimedia	IT
5.	150304/160304/BCSL303/BITL303/ CSL305 /ITL305/3Y51	Object Oriented Programming and Methodology	CSE/IT
6.	BCSL305/BITL305	Operating System	CSE/IT
7.	CSL 304/ITL 304/3Y52	Computer System Organization	CSE/IT

Semester: II and Year: I

S. No.	Code(s)	Subject	Branches in which the question paper is applicable
1.	160211/150211	Data Structures	C.S.E/I.T.
2.	160212/150212	Object Oriented Programming & Methodology	C.S.E/I.T.
3.	160213/150213	Digital Electronics	C.S.E/I.T.
4.	BCSL 203/BITL 203	Data Structures	C.S.E/I.T.

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EQUIVALENCE LIST

B.E./B.Tech

Semester: I/II and Year: I

S. No.	Code(s)	Subject	Branches in which the question paper is applicable
1.	100203(Equivalent Codes: EEL/ELL/ITL/CHL/BTL/CEL/MEL/CSL- 113/2X73)	Basic Computer Engineering	ALL
2.	BCSL 104/BITL 104(For Student admitted in year 2015 & 2016) CBCS Pattern	Basic Computer Engineering	C.S.E/ I.T.
3.	BCSL/BCEL/BMEL/BITL/BBTL-105(For Student admitted in year 2015 & 2016) CBCS Pattern	Basic Computer Programming	ALL

**List
of
Examiners for PG dissertation
for
Conducting Practical Examination
[ITEM CSEIT -12(a)]**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Panel of External Examiner for PG

Sr. No.	Name of External Examiner	Designation	Affiliation	Phone No.
1.	Dr. A. K. Solanki,	Professor	Bundelkhand Institute Of Engineering & Technology, Kanpur Road NH-25 JHANSI (U.P.)-284128	0510 232 0349
2.	Prof. Mayank Dave	Professor	NIT Near Kurukshetra University, Kurukshetra, Thanesar, Haryana 136119	01744233480
3.	Dr. Nanhay Singh	Professor	Ambedkar Institute of Advanced Communication Technologies and Research , Krishna Nagar Road Chacha Nahru Bal Chikitsalaya, Geeta Colony, New Delhi, Delhi 110031	011 2612 5195
4.	Dr. R. K. Pateriya	Associate Professor	Maulana Azad National Institute of Technology, Link Road Number 3, Near Kali Mata Mandir, Bhopal, Madhya Pradesh, India 462003	0755 405 1000
5.	Dr. Mukul Shukla	Associate Professor	Shri Govindram Seksaria Institute of Technology and Science, 23 Sir M. Visvesvaraya Marg, Indore, Madhya Pradesh 452003	0731 254 8335
6.	Dr. Om Prakash Sangwan	Associate Professor	Guru Jambheshwar University of Science & Technology, Delhi Road, Hisar, Haryana 125001	0166 226 3143
7.	Dr. Shashikant Pandey	Associate Professor	VNS Campus, Neelbud, Bhopal, Madhya Pradesh 462044	9300689922
8.	Dr. Ashish K. Jain	Reader	Institute of Engineering and Technology Devi Ahilya Vishwavidyalaya Khandwa Road Indore-452017 (M.P.)	9009921496
9.	Dr. G. S. Tomar	Professor	THDC Institute of Hydropower Engineering and Technology, Bhagirathipuram Tehri; Tehri Garhwal; Pincode-249124	09425744460
10.	Dr. Shailendra Singh	Professor	National Institute Of Technical Teachers Training And Research Institute, Science Center Road, Shanthi Marg, Bhopal, Madhya Pradesh 462002	9425011658
11.	Prof. Rajesh Kumar Aggarwal	Associate Professor	National Institute of Technology, Kurukshetra, Haryana (India) 136119	01744-233483, 233259, 233479

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13.	Dr. Yashpal Singh	Associate Professor	Bundelkhand Institute Of Engineering & Technology, Kanpur Road NH-25 JHANSI (U.P.)-284128	9415030602
14.	Dr. Tanvir Ahmad	Professor & Head	Jamia Millia Islamia, Maulana Mohammad Ali Jauhar Marg, Jamia Nagar, New Delhi, Delhi 110025	011-26980281,26981717
15.	Dr. Manish Shrivastava	Professor	Lakshmi Narain College of Technology, Raisen Rd, Kalchuri Nagar, Bhopal, Madhya Pradesh ,462021	9827296290
16.	Dr. Anand Srivastava	Professor	Indraprastha Institute of Information Technology, New Delhi - 110020	011-26907450 9810998054
17.	Dr. Anuradha Purohit	Associate Professor	Shri Govindram Seksaria Institute of Technology and Science,23 Sir M. Visvesvaraya Marg, Indore, Madhya Pradesh 452003	9826065208
18.	Dr. Vandan Tewari	Associate Professor	Shri Govindram Seksaria Institute of Technology and Science,23 Sir M. Visvesvaraya Marg, Indore, Madhya Pradesh 452003	9425108291
19.	Dr. Roopam Gupta	Professor	University Institute of Technology, Rajiv Gandhi Proudhyogiki Vishwavidyalaya, Airport Bypass Road, Gandhi Nagar, Bhopal, Madhya Pradesh - 462033Bhopal, (M.P.)	9425004437
20.	Dr. Pratosh Bansal	Professor	Institute of Engineering and Technology Devi Ahilya Vishwavidyalaya Khandwa Road Indore-452017 (M.P.)	9981643512
21.	Dr. Sunita Verma	Professor	Shri Govindram Seksaria Institute of Technology and Science,23 Sir M. Visvesvaraya Marg, Indore,	9425056970

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			Madhya Pradesh 452003	
22.	Dr. Nirupama Tiwari	Associate Professor	ShriRam College of Engineering & Management , National Expressway, Opp :Narrow Gauge Railway Station, Banmore - 476 444, Near Gwalior (MP)	9425473504, 0751-4012707
23.	Dr. Manoj Kumar Bohra	Associate Professor	Manipal University Jaipur, Jaipur-Ajmer Express Highway, Dehmi Kalan, Near GVK Toll Plaza, Jaipur, Rajasthan 303007	9460756900, 8112298358
24.	Dr. Yogesh Gupta	Associate Professor	Manipal University Jaipur, Jaipur-Ajmer Express Highway, Dehmi Kalan, Near GVK Toll Plaza, Jaipur, Rajasthan 303007	90680 39711
25.	Dr. Saurabh Mukharjee	Professor	Department of Computer Science, Banasthali Vidyapith, Kalyan tent house, Vanasthali, Rajasthan 304022	7742114404
26.	Dr. Jaydeep Dhar	Professor	ABV-Indian Institute of Information Technology and Management Gwalior, Morena Link Rd, IIITM Campus, Gwalior, Madhya Pradesh 474015	9425117063
27.	Dr. Kamlesh Gupta	Associate Professor	Rustamji Institute Of Technology, Border Security Force Academy, Tekanpur, Gwalior (M.P.)-India-475005	9425757684
28.	Dr. Arvind Kumar Upadhyay	Professor	Amity University, Maharajpura (Opposite Airport), Gwalior, Madhya Pradesh 474 005	9899307496
29.	Dr. Vrinda Tokekar	Professor	Institute of Engineering and Technology Devi Ahilya Vishwavidyalaya Khandwa Road Indore-452017 (M.P.)	94253 17939
30.	Dr. Hemant Makwana	Reader	Institute of Engineering and Technology Devi Ahilya Vishwavidyalaya Khandwa Road Indore-452017 (M.P.)	9826046442

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31.	Dr. G.L. Prajapati	Professor	Institute of Engineering and Technology Devi Ahilya Vishwavidyalaya Khandwa Road Indore-452017 (M.P.)	98266 69205
32.	Dr. Meena Sharma	Professor	Institute of Engineering and Technology Devi Ahilya Vishwavidyalaya Khandwa Road Indore-452017 (M.P.)	98269 27378
33.	Dr. Pragya Shukla	Professor	Institute of Engineering and Technology Devi Ahilya Vishwavidyalaya Khandwa Road Indore-452017 (M.P.)	94250 82663
34.	Dr. Dinesh K. Vishwakarma	Associate Professor	Delhi Technological University Shahbad Daultpur, Main Bawana Road, Delhi-110042, India	9971339840
35.	Dr. Nilay Khare	Professor	Maulana Azad National Institute of Technology, Link Road Number 3, Near Kali Mata Mandir, Bhopal, Madhya Pradesh, India 462003	0755-4051319
36.	Dr. Praveen Kaushik	Associate Professor	Maulana Azad National Institute of Technology, Link Road Number 3, Near Kali Mata Mandir, Bhopal, Madhya Pradesh, India 462003	0755-4051303
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38.	Dr. Sunita Varma	Professor	Shri Govindram Seksaria Institute of Technology and Science, 23 Sir M. Visvesvaraya Marg, Indore, Madhya Pradesh 452003	9425056970
39.	Dr. Vandan Tewari	Associate Professor	Shri Govindram Seksaria Institute of Technology and Science, 23 Sir M. Visvesvaraya Marg, Indore, Madhya Pradesh 452003	9425108291
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46.	Dr. Pilli Emmanuel Shubhakar	Associate Professor	Malaviya National Institute of Technology Jaipur JLN Marg, Jaipur, Rajasthan - 302017	0141-2713376
47.	Dr. Dinesh Gopalani	Associate Professor	Malaviya National Institute of Technology Jaipur JLN Marg, Jaipur, Rajasthan - 302017	0141-2713430
48.	Dr. Meenakshi Tripathi	Associate Professor	Malaviya National Institute of Technology Jaipur JLN Marg, Jaipur, Rajasthan - 302017	0141-2713419
49.	Dr. Mushtaq Ahmed	Associate Professor	Malaviya National Institute of Technology Jaipur JLN Marg, Jaipur, Rajasthan - 302017	0141-2713361
50.	Dr. Namita Mittal	Associate Professor	Malaviya National Institute of Technology Jaipur JLN Marg, Jaipur, Rajasthan - 302017	0141-2713324
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54.	Dr. Amod Tiwari	Associate Professor	DOIT, REC, Sonbhadra	9415539025
55.	Dr. Munesh Chandra	Associate Professor	Dept of CSE, NIT, Tripura	999013200
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60.	Dr. S.K. Gupta	Assistant Professor	Bundelkhand Institute Of Engineering & Technology, Kanpur Road NH-25 JHANSI (U.P)-284128	9415057834
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Annexure-XII

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Data Structures and Algorithms (DC-1)

Objective:

- To understand the abstract data types stack, queue, dequeue, trees, lists etc.
- To be able to design efficient algorithms using various data structures.
- To understand design techniques the time complexity of algorithms.

UNIT-I

Prerequisites: Array, Structure, pointers, pointer to structure, functions, parameter passing, recursion.

Stack and Queue: contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue-operations

UNIT-II

General List: list and its contiguous implementation, its drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.

Time Complexity: models of computation, algorithm analysis, order architecture, time space complexities, computing the average and worst case analysis.

UNIT-III

Trees: definitions-height, depth, order, degree, parent and children relationship etc; Binary Trees- various theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, inorder and post order traversals, their recursive and non-recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition. Miscellaneous features Basic idea of AVL tree- definition, insertion & deletion operations; basic idea of B-tree- definition, order, degree, insertion & deletion operations; B-tree- definitions, comparison with B-tree; basic idea of string processing.

UNIT-IV

Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubblesort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

UNIT-V

Graphs: Overview, related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskal & amp; dijkstra algorithm.

Books:

1. Theory and Problems of Data Structures, Seymour Lipschutz, Schaum'S Outline Series, McGraw Hill.
2. Kruse R.L. Data Structures and Program Design in C; PHI
3. Tennen Baum A.M. & amp; others: Data Structures using C & amp; C++; PHI
4. Horowitz & amp; Sawhney: Fundamentals of Data Structures, Galgotia Publishers.
5. Ullman & amp;quot; Analysis and Design of Algorithm & amp;quot; TMH
6. Goodman & amp;quot; Introduction to the Design & amp;quot; Analysis of Algorithms, TMH-2002.
7. Sara Basse, A. V. Gelder, & amp;quot; Computer Algorithms, & amp;quot; Addison Wesley
8. T. H. Cormen, Leiserson, Rivest and Stein, & amp;quot; Introduction of Computer algorithm, & amp;quot; PHI

Course Outcomes:

Student would be able to

- CO1: **Discuss** the basics of data structures.
- CO2: **Design** various linear and non-linear data structures available
- CO3: **Describe** several sorting algorithms including quick sort, merge sort and heapsort.
- CO4: **Organize** some graph algorithms such as shortest path and minimum spanning tree
- CO5: **Analyze** the complexity of various algorithms for different data structures
- CO6: **Evaluate** different data structure techniques for real world problems.