

**MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR**  
(A Govt. Aided UGC Autonomous Institute, Affiliated to RGPV, Bhopal)  
*NAAC Accredited with A++ Grade*

**BOARD OF STUDIES (BoS) PROCEEDING**  
**IN**  
**INFORMATION TECHNOLOGY**  
*(Meeting Dated – 1<sup>st</sup> December, 2023)*

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

***NAAC Accredited with A++ Grade***

Department of Information Technology

Date: 01/12/2023

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

The Meeting of **Board of Studies (BoS) in Information Technology** was held on 1<sup>st</sup> December 2023 at 11:30 A.M. onwards in **offline/online mode (through video conferencing)**. During the meeting following were present.

1.	Dr. Sanjiv Sharma, Assistant Professor, Programme Coordinator	Chairman
2.	Dr. Surya Prakash Discipline of Computer Science and Engineering, School of Engineering, Indian Institute of Technology Indore Indore-453552, Madhya Pradesh, India	External Member (Academics) <i>(Nominee of Hon'ble Vice Chancellor RGPV Bhopal)</i>
3.	Dr. Deepak Garg Vice-Chancellor, SR University, Telangana	External Member (Academics)
4.	Dr. Nisha Chaurasia, Assistant Professor, Department of Information Technology, Dr. B. R. Ambedkar National Institute of Technology, Jalandhar (Punjab)	External Member (Alumnus)
5.	Dr. Vivek Tiwari, Department of Computer Science Engineering, ABV- Indian Institute of Information Technology and Management, Gwalior (ABV-IIITM)	Invitee Member (Academics)
6.	Dr. Punit Kumar Johari, Assistant Professor	Member
7.	Mr. Vikas Sejwar, Assistant Professor	Member
8.	Dr. Abhilash Sonker, Assistant Professor	Member
9.	Mr. Rajeev Kumar Singh, Assistant Professor	Member
10.	Ms. Neha Bhardwaj, Assistant Professor	Member
11.	Dr. Saumil Maheshwari, Assistant Professor	Member
12.	Dr. Vikram Rajpoot, Assistant Professor	Member
13.	Dr. Abhishek Dixit, Assistant Professor	Member
14.	Dr. Nidhi Saxena, Assistant Professor	Member

*In addition to above, faculty members under contractual engagement were also present.*

**The following external and internal members could not attend the meeting.**

1.	Dr. Dinesh Kumar Vishwakarma, Professor, Department of Information Technology, Delhi Technological University (DTU), Delhi	External Member (Academics)
2.	Mr. Abhinav Mishra, Sr. Director, Persistent System Limited	External Member (Industry)

**The following student members/ representatives was also present in the meeting.**

1.	Abhishek Kumar Shrivastava	0901IT221003
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*(Handwritten signatures and initials)*

The following deliberation took place in the meeting:

ITEM IT-1:	<p>To confirm the minutes of previous BoS meeting held in the month of June 2023.</p> <p><b>The minutes of previous Board of Studies (BoS) meeting held on 2<sup>nd</sup> June 2023 were presented, discussed and confirmed.</b></p>				
ITEM IT-2:	<p>The examination committees constituted vide Dean Academics Notice no 1332 dated 20/4/2021 need to be reconstituted this year.</p> <p><b>The examination committee was constituted, finalized and recommended. The same is Annexed as Annexure-I.</b></p>				
ITEM IT-3:	<p>To propose the scheme structure of <b>VIII Semester</b> with the provision of <b>ONE DE &amp; ONE OC course</b> to be offered in <b>online mode</b> with credit transfer for the batch admitted in academic year 2020-21. (The total credits from I-VIII semester should not be less than 160 for this batch).</p> <p><b>The scheme structure of VIII Semester was discussed, finalized and recommended with the provision of ONE DE &amp; ONE OC (to be offered in online mode) with credit transfer. The same is Annexed as Annexure-II.</b></p>				
ITEM IT-4:	<p>To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in online mode under <b>Departmental Elective (DE) category courses (DE-5) and open category (OC3)</b> for credit transfer in the <b>VIII Semester</b> under the flexible curriculum (Batch admitted in academic year 2020-21)</p> <p><b>The list of Departmental Elective (DE) category courses (DE-5) and open category (OC-4) to be offered from SWAYAM/NPTEL/MOOC based learning platform/ Institutional MOOC (in online mode) for B. Tech VIII Semester IT discipline (under flexible curriculum) were discussed and recommended, as per the following detail</b></p> <table border="1" data-bbox="388 1126 1423 1294"> <tr> <th data-bbox="388 1126 1423 1176" style="text-align: center;"><b>DE-5 (B. Tech IT):</b></th> </tr> <tr> <td data-bbox="388 1176 1423 1294"> <ul style="list-style-type: none"> <li>• Foundations of Cryptography (12 Weeks)</li> <li>• Blockchain and its Applications (12 Weeks)</li> <li>• Edge Computing (8 Weeks)</li> </ul> </td> </tr> </table> <table border="1" data-bbox="388 1330 1423 1498"> <tr> <th data-bbox="388 1330 1423 1379" style="text-align: center;"><b>OC-4 (Offered by IT Department):</b></th> </tr> <tr> <td data-bbox="388 1379 1423 1498"> <ul style="list-style-type: none"> <li>• Getting Started with Competitive Programming (12 Weeks)</li> <li>• Introduction To Soft Computing (8 Weeks)</li> <li>• Social Networks (12 Weeks)</li> </ul> </td> </tr> </table> <p><i>In continuation, it is also discussed and recommended that the above mentioned list of Departmental Elective (DE) category courses (DE-5) and open category (OC-4) may be kept dynamic and newly emerging courses may be inducted in line with the industrial need and emerging developments (as and when desired).</i></p> <ul style="list-style-type: none"> <li>• Foundation of Cloud IoT Edge ML (8 Weeks)</li> </ul>	<b>DE-5 (B. Tech IT):</b>	<ul style="list-style-type: none"> <li>• Foundations of Cryptography (12 Weeks)</li> <li>• Blockchain and its Applications (12 Weeks)</li> <li>• Edge Computing (8 Weeks)</li> </ul>	<b>OC-4 (Offered by IT Department):</b>	<ul style="list-style-type: none"> <li>• Getting Started with Competitive Programming (12 Weeks)</li> <li>• Introduction To Soft Computing (8 Weeks)</li> <li>• Social Networks (12 Weeks)</li> </ul>
<b>DE-5 (B. Tech IT):</b>					
<ul style="list-style-type: none"> <li>• Foundations of Cryptography (12 Weeks)</li> <li>• Blockchain and its Applications (12 Weeks)</li> <li>• Edge Computing (8 Weeks)</li> </ul>					
<b>OC-4 (Offered by IT Department):</b>					
<ul style="list-style-type: none"> <li>• Getting Started with Competitive Programming (12 Weeks)</li> <li>• Introduction To Soft Computing (8 Weeks)</li> <li>• Social Networks (12 Weeks)</li> </ul>					
ITEM IT-5:	<p>To propose the list of “Additional Courses” which can be opted for getting an</p> <ol style="list-style-type: none"> <li>i. Honours (for students of the host department)</li> <li>ii. Minor Specialization (for students of other departments)</li> </ol> <p><i>[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the B. Tech. VIII semester students (for the batch admitted in 2020-21)] and for B. Tech. VI semester (for the batch admitted in 2021-22)]</i></p>				

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

**B. Tech IT VI Semester (2021-22 admitted batch)**

**Additional Courses for "Honours" (Parent Department)**

**Specialization 1: Artificial Intelligence and Machine Learning**

- Machine Learning for Engineering and science applications (12 Weeks)
- AI:Constraint Satisfaction (8 Weeks)

**Specialization 2: Data Analytics**

- Data Science for Engineers (8 Weeks)
- Business Intelligence & Analytics (12 weeks)

**Specialization 3: Robotics**

- Embedded Systems Design (12 weeks)
- AI:Constraint Satisfaction (8 Weeks)

**Additional Courses for "Minor Specialization" (Other Departments)**

- Programming in Java (12 Weeks)
- Programming, Data Structures and Algorithms in Python (8 Weeks)
- Design and analysis of algorithms (8 Weeks)
- Introduction to Database Systems (12 Weeks)

**B. Tech IT VIII Semester (2020-21 admitted batch)**

**Additional Courses for "Honours" (Parent Department)**

- Machine Learning for Engineering and science applications (12 Weeks)
- Natural Language Processing (12 Weeks)
- Recommender Systems (8 Weeks)
- Reinforcement Learning (12 Weeks)
- Advanced Distributed Systems (12 Weeks)
- Object Oriented System Development Using UML, Java And Patterns (12 Weeks)
- Advanced Computer Architecture (12 Weeks)
- The Joy of Computing using Python (12 Weeks)
- GPU Architectures And Programming (12 Weeks)

**Additional Courses for "Minor Specialization" (Other Departments)**

- Selected Topics in Algorithms (12 Weeks)
- Computer Networks And Internet Protocol (12 Weeks)
- Fuzzy Logic And Neural Networks (8 Weeks)
- Programming in Java (12 Weeks)
- Programming, Data Structures and Algorithms Using Python (8 Weeks)
- Design and analysis of algorithms (8 Weeks)
- Introduction To Internet Of Things (12 Weeks)
- Introduction to Database Systems (12 Weeks)

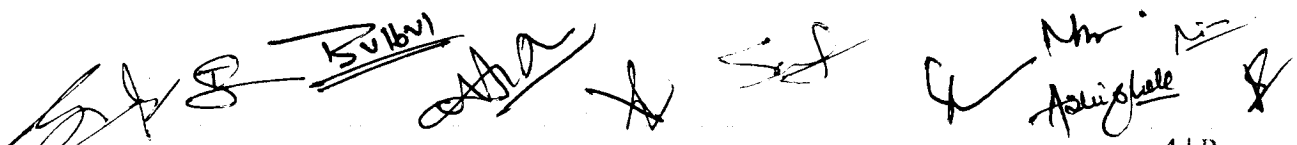
In continuation, it is discussed that the above list must be kept dynamic and additional courses may be inducted (as per the requirement).

ITEM IT-6: To review and finalize the scheme structure of B. Tech VI Semester under the flexible curriculum (Batch admitted in 2021-22)

The Scheme structure of B. Tech. VI Semester [Information Technology] was discussed and recommended. The same is Annexed as Annexure-III.



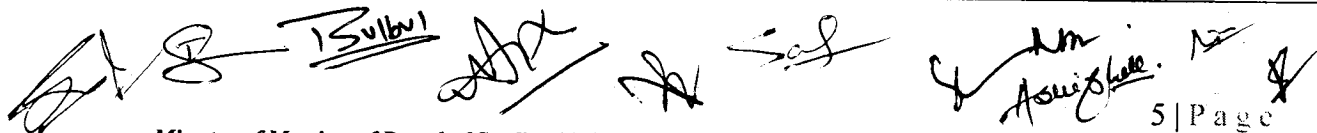
ITEM IT-7:	<p>To review &amp; finalize the syllabi for all Departmental Core Courses (DC) of B. Tech VI Semester (for batch admitted in 2021-22) under the flexible curriculum along with their COs</p> <p><b>The Syllabi of all the Departmental Core (DC) Courses, to be offered during B. Tech. VI Semester [Information Technology] along with their COs under flexible curriculum were discussed and recommended. The same is Annexed as Annexure-IV.</b></p>		
ITEM IT-8:	<p>To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered (for batches admitted in 2021-22) in online mode under Departmental Elective (DE-1) Course with credit transfer, in the VI Semester</p> <p><b>The list of Departmental Elective (DE-1) courses to be offered from SWAYAM/NPTEL/MOOC based learning platforms with credit transfer (in online mode) for B. Tech. VI Semester [Information Technology] (under flexible curriculum) were discussed and recommended, as per the following detail</b></p> <table border="1" data-bbox="435 689 1398 869"> <thead> <tr> <th data-bbox="435 689 1398 734">DE-1 (B. Tech IT):</th> </tr> </thead> <tbody> <tr> <td data-bbox="435 734 1398 869"> <ul style="list-style-type: none"> <li>• Introduction To Internet Of Things (12 Weeks)</li> <li>• Foundation of Cloud IoT Edge ML (8 Weeks)</li> <li>• Cloud Computing and Distributed Systems (8 Weeks)</li> </ul> </td> </tr> </tbody> </table>	DE-1 (B. Tech IT):	<ul style="list-style-type: none"> <li>• Introduction To Internet Of Things (12 Weeks)</li> <li>• Foundation of Cloud IoT Edge ML (8 Weeks)</li> <li>• Cloud Computing and Distributed Systems (8 Weeks)</li> </ul>
DE-1 (B. Tech IT):			
<ul style="list-style-type: none"> <li>• Introduction To Internet Of Things (12 Weeks)</li> <li>• Foundation of Cloud IoT Edge ML (8 Weeks)</li> <li>• Cloud Computing and Distributed Systems (8 Weeks)</li> </ul>			
ITEM IT-9:	<p>To review and finalize the courses &amp; syllabi to be offered (for batch admitted in 2021-22) under the Open Category (OC) Courses (in traditional mode) for VI semester students of other departments along with their COs</p> <p><b>The courses to be offered under Open Category (OC) Courses for B. Tech. VI Semester [Information Technology] (for the students of other departments) were discussed and recommended as per the following detail</b></p> <table border="1" data-bbox="650 1160 1226 1361"> <thead> <tr> <th data-bbox="650 1160 1226 1205">Offered by IT Department</th> </tr> </thead> <tbody> <tr> <td data-bbox="650 1205 1226 1361"> <p><b>OC-1:</b></p> <ul style="list-style-type: none"> <li>• Networking with TCP/IP</li> <li>• Software Engineering</li> <li>• Cryptography &amp; Network Security</li> </ul> </td> </tr> </tbody> </table> <p><i>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 expanded (as per the need and demand from other departments). The detailed syllabi (along with their COs) is Annexed as Annexure-V.</i></p>	Offered by IT Department	<p><b>OC-1:</b></p> <ul style="list-style-type: none"> <li>• Networking with TCP/IP</li> <li>• Software Engineering</li> <li>• Cryptography &amp; Network Security</li> </ul>
Offered by IT Department			
<p><b>OC-1:</b></p> <ul style="list-style-type: none"> <li>• Networking with TCP/IP</li> <li>• Software Engineering</li> <li>• Cryptography &amp; Network Security</li> </ul>			
ITEM IT-10:	<p>To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses to be offered in B. Tech. VI semester (for batch admitted in 2021-22).</p> <p><b>The Experiment list / Lab manual for the Laboratory Courses for VI semester of B. Tech [Information Technology] were discussed and finalized. The same is annexed as Annexure-VI.</b></p>		
ITEM IT-11:	<p>To review and finalize the suggestive list of projects which can be offered under the 'Skill based mini-project' category in various laboratory components based courses to be offered in B. Tech. VI Semester (for the batch admitted in 2021-22).</p> <p><b>The list of "skill based mini project" for the Laboratory Courses of B. Tech. VI Semester [Information Technology] (for 2021-22 admitted batch) was discussed and</b></p>		



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Minutes of Meeting of Board of Studies (BoS) in Information Technology held on 1<sup>st</sup> December 2023

	<p>finalized. It was also discussed that the list must be treated as dynamic and more projects can be added by the course faculty. The same is annexed as Annexure-VII.</p>
ITEM IT-12:	<p>To review and finalize the scheme and syllabi of B. Tech. IV Semester (for batch admitted in 2022-23) under the flexible curriculum along with their COs.</p> <p>The Scheme Structure and Syllabi of B. Tech. IV Semester [<i>Information Technology</i>] (for batches admitted in 2022-23) under the flexible curriculum were discussed, finalized and recommended. The scheme structure &amp; syllabi (along with their COs) is annexed as Annexure-VIII.</p>
ITEM IT-13:	<p>To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses to be offered in B. Tech IV semester (for batch admitted in 2022-23)</p> <p>The experiment list / lab manual for the Laboratory Courses for B. Tech IV Semester [<i>Information Technology</i>] were discussed and finalized. The same is annexed as Annexure-IX.</p>
ITEM IT-14:	<p>To review and finalize the suggestive list of projects which can be offered under the ‘Skill based mini-project’ category in various laboratory components based courses to be offered in B. Tech IV Semester (for the batch admitted in 2022-23).</p> <p>The list of “Skill based mini project” for the Laboratory Courses of B. Tech. IV Semester [<i>Information Technology</i>] (for 2022-23 admitted batch) was discussed and finalized. It was also discussed that the list must be treated as dynamic and more projects can be added by the course faculty. The same is annexed as Annexure-X.</p>
ITEM IT-15:	<p>To review and finalize the scheme and syllabi of B. Tech. II Semester (for batch admitted in 2023-24) under the flexible curriculum along with their COs.</p> <p>The Scheme, Syllabi of B. Tech. II semester [<i>Information Technology</i>] were discussed and recommended in its present form. The same is annexed as Annexure-XI.</p>
ITEM IT-16:	<p>To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses to be offered in Batch II semester (for batch admitted in 2023-24).</p> <p>The experiment list / lab manual for the Laboratory Courses for B. Tech II Semester [<i>Information Technology</i>] were discussed and finalized. The same is annexed as Annexure-XII.</p>
ITEM IT-17:	<p>To review and finalize the suggestive list of projects which can be offered under the ‘Skill based mini-project’ category in various laboratory components based courses to be offered in B. Tech IV Semester (for the batch admitted in 2023-24).</p> <p>The list of “skill based mini project” for the Laboratory Courses of B. Tech. II Semester [<i>Information Technology</i>] (for 2023-24 admitted batch) was discussed and finalized. It is also discussed that the list must be treated as dynamic and more projects can be added by the course faculty. The same is annexed as Annexure-XIII.</p>
ITEM IT-18:	<p>To review the CO attainments, identify gaps and suggest corrective measures for the improvement in the CO attainment levels for the courses taught in Jan-June 2023 Session.</p> <p>The attainment level of Course Outcomes (COs) for all the courses pertaining to January - June 2023 Session for I to IV Year was presented. In continuation, it was 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 the Question Paper and interaction with the students for possible improvement. The same is annexed as Annexure-XIV.</p>


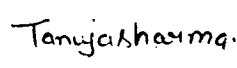
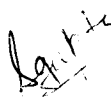



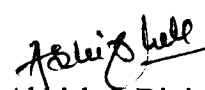


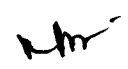






ITEM IT-19:	To review the PO attainment, CO-PO mapping matrix and action to be taken to improve PO attainment level.  <b>The Programme Outcome (PO) attainment, CO-PO mapping matrix with attainments and gap analysis for 2019-2023 passout batch were discussed and reviewed. The same is annexed as Annexure-XV.</b>
ITEM IT-20:	To review curricula feedback from various stakeholders, its analysis and impact  <b>The summarized report of curricula feedback from various stakeholders (students, faculty members and alumni etc.) (for Jan. 2023 to June 2023 (II, IV &amp; VI Semester) was presented and discussed. This was based on various considered parameters. The report is annexed as Annexure-XVI.</b>
ITEM IT-21:	To discuss and recommend the scheme structure & syllabi of PG Programme (M. Tech.) along with their Course Outcomes (COs).  <b>The Scheme Structure and Syllabi of M. Tech. II Semester [Information Technology] (for batches admitted in 2023-24) were discussed, finalized and recommended. The Scheme Structure &amp; syllabi (along with their COs) is annexed as Annexure- XVII.</b>
ITEM IT-22:	To ratify the Tracks of Honours Specialization offered under B. Tech V Semester  <b>The Honours Specialization (through SWAYAM/NPTEL/MOOC Platforms) is to be offered in three different tracks for B. Tech V Semester [Information Technology] (for batches admitted in 2021-22) were presented and discussed.</b>

**Suggestions by External Experts / Members:**

- It was suggested to add the contents related to retrieval techniques in the course/subject- "Image Processing & Retrieval Techniques" offered under M. Tech. II Semester [Information Technology].
- It was suggested to provide the recent edition book as recommendation with syllabus.

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

 Mr. Shubham Sharma	 Ms. Tanuja Sharma	 Ms. Surbhi Gupta	 Ms. Akanchha Tiwari
 Ms. Bulbul Agrawal	 Dr. Nidhi Saxena	 Dr. Abhishek Dixit	 Dr. Vikram Rajpoot
 Dr. Saumil Maheshwari	 Ms. Neha Bhardwaj	 Mr. Rajeev Kumar Singh	 Dr. Abhilash Sonkar
 Mr. Vikas Sejwar	 Dr. Punit Kumar Johari		

Absent

Mr. Abhinav Mishra  
Co-Founder & CEO at Altysys  
and Former Sr. Director, Persistent  
System Limited

Online Present

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

online Present

Dr. Vivek Tiwari  
Associate Professor,  
Department of Computer  
Science Engineering,  
ABV- Indian Institute of  
Information Technology and  
Management, Gwalior

Assent

Dr. Dinesh Kumar Vishwakarma  
Professor,  
Department of Information  
Technology,  
Delhi Technological University  
(DTU), Delhi

online Present

Dr. Deepak Garg  
Vice-Chancellor,  
SR University, Telangana

online present

Dr. Surya Prakash  
Professor,  
Discipline of Computer  
Science and  
Engineering, School of  
Engineering,  
Indian Institute of Technology  
Indore



Dr. Sanjiv Sharma  
Assistant Professor & Coordinator Department of IT,  
Chairman, BoS

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**ANNEXURE - I**

***Examination Committee***  
***(Information Technology)***  
***[ITEM IT -2]***

**MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR**  
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**Department of IT**

**Note Sheet**

Date: 12/12/2023

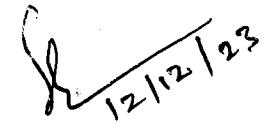
As per the notice ref. no DA/MP/23/69 dated 1/11/23, During the BoS meeting held on 1/12/2023 in the Department of IT has proposed the following internal members of examination committee:

1. Dr. Sanjiv Sharma, Program Coordinator, Chairperson of BoS
2. Dr. Punit Johari , Assistant Professor

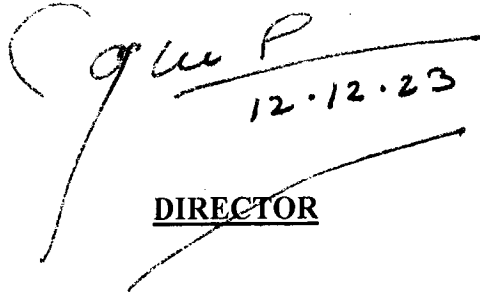
It is requested to kindly approve the above mentioned examination committee and nominate one member of the other department as a director nominee.

**Submitted for kind your approval**

Dr. Laxmi Shrivastava (Chair)

  
(Dr. Sanjiv Sharma)  
Coordinator  
Department of IT

APR

  
12.12.23  
**DIRECTOR**

84  
12/12/23

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**ANNEXURE - II**

*Scheme*  
*of*  
*B. Tech VIII Semester*  
*(Batch Admitted in 2020-21)*  
*(Information Technology)*  
*Under Flexible Curriculum*  
*[ITEM IT -3]*

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Department of Information Technology

### Scheme of Evaluation

#### B. Tech. VIII Semester (IT)

(for batch admitted in academic session 2020 – 21)

*M.B.*  
29/01/2021  
DEAN (ACADEMICS)  
MITS  
GWALIOR

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted									Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.
				Theory Slot				Practical Slot			MOOCs			L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation		Assignment	Exam							
				End Sem. Exam.	<sup>s</sup> Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project									
1.	DE	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Blended	MCQ
2.	OC	OC	Open Category* (OC-3)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Blended	MCQ
3.	DLC 160811	DLC	Internship/Research Project/ Innovation & Start-up***	-	-	-	-	250	150	-	-	-	400	-	-	18	9	Blended	SO
4.	160812	-	Professional Development#	-	-	-	-	50	-	-	-	-	50	-	-	4	2	Interactive	SO
<b>Total</b>				-	-	-	-	<b>300</b>	<b>150</b>	-	<b>50</b>	<b>150</b>	<b>650</b>	<b>6</b>	-	<b>22</b>		-	-
<b>Additional Course for Honours or minor Specialization</b>				<b>Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization</b>															

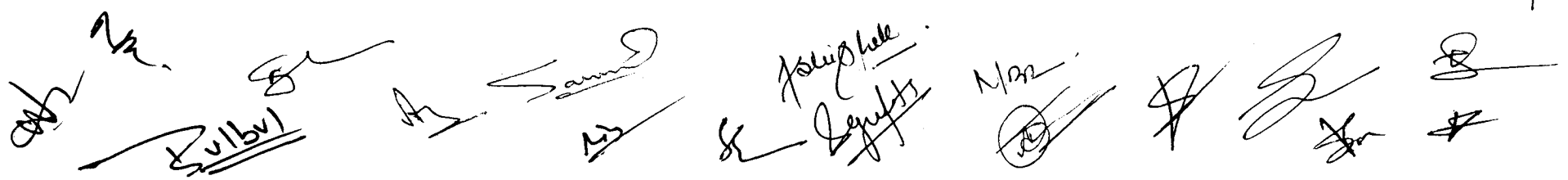
<sup>s</sup> proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

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

\*All of these courses will run through SWAYAM/NPTEL/ MOOC with credit transfer

#Evaluation 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, technical events, institute/department committees, etc.)

Mode of Teaching					Mode of Examination					Total Credits
Theory			Lab	PD	Theory			Lab	NEC	
Offline	Online	Blended	Offline	Interactive	PP	AO	MCQ	SO	SO	
-	-	06	09	02	-	-	06	09	02	17
-	-	35.29%	52.95%	11.76%	-	-	35.29%	52.95%	11.76%	Credits %





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MIO  
DEAN (ACADEMICS)  
MITS  
23/10/2024

DE-5*		
S. No.	Subject Code	Subject Name
1.	160861	Foundations of Cryptography (12 Weeks)
2.	160862	Blockchain and its Applications (12 Weeks)
3.	160863	Edge Computing (8 Weeks)

OC-3*		
S. No.	Subject Code	Subject Name
1.	910601	Getting Started with Competitive Programming (12 Weeks)
2.	910602	Introduction To Soft Computing (8 Weeks)
3.	910603	Social Networks (12 Weeks)
4.	910604	Foundation of Cloud IoT Edge ML (8 Weeks)

**List of courses to be opted for Honours or Minor specialization in VIII Semester**

Honours* (to be opted by students of Parent Department)		Minor specialization * (to be opted by students of Other Department)	
Course Code	Course Name	Course Code	Course Name
IT0824H1	Machine Learning for Engineering and science applications (12 Weeks)	IT0824M1	Selected Topics in Algorithms (12 Weeks)
IT0824H2	Natural Language Processing (12 Weeks)	IT0824M2	Computer Networks And Internet Protocol (12 Weeks)
IT0824H3	Recommender Systems (8 Weeks)	IT0824M3	Fuzzy Logic And Neural Networks (8 Weeks)
IT0723H1	Reinforcement Learning (12 Weeks)	IT0521M2	Programming in Java (12 Weeks)
IT0723H3	Advanced Distributed Systems (12 Weeks)	IT0620M2	Programming, Data Structures and Algorithms Using Python (8 Weeks)
IT0623H2	Object Oriented System Development Using UML, Java And Patterns (12 Weeks)	IT0621M1	Design and analysis of algorithms (8 Weeks)
IT0623H4	Advanced Computer Architecture (12 Weeks)	IT0723M2	Introduction To Internet Of Things (12 Weeks)
IT0623H3	The Joy of Computing using Python (12 Weeks)	IT0623M1	Introduction to Database Systems (12 Weeks)
IT0620H2	GPU Architectures And Programming (12 Weeks)		

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

Note: In each semester (starting from V to VIII semester), it is required to opt for new subjects towards Honours Degree/ Minor Specialization.

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**ANNEXURE - III**

*Scheme  
of  
B. Tech VI Semester  
(Batch Admitted in 2021-22)  
(Information Technology)  
Under Flexible Curriculum  
[ITEM IT -6]*

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## Department of Information Technology

### Scheme of Evaluation

#### B. Tech. VI Semester (IT)

**(for batch admitted in academic session 2021-22)**

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted									Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	
				Theory Slot				Practical Slot			MOOCs			L	T	P				
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation		Assignment	Exam								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project										
1.	160615	DC	Compiler Design	50	10	20	20	60	20	20	-	-	200	2	1	2	4	Blended	PP	
2.	160616	DC	Data Mining & Pattern Warehousing	50	10	20	20	60	20	20	-	-	200	3	-	2	4	Blended	PP	
3.	160617	DC	Artificial Intelligence & Machine Learning	50	10	20	20	60	20	20	-	-	200	3	-	2	4	Blended	PP	
4.	DE	DE	Departmental Elective* (DE-1)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	
5.	OC	OC	Open Category (OC-1)	50	10	20	20	-	-	-	-	-	100	3	-	-	3	Blended	PP	
6.	160618	DLC	Minor Project-II**	-	-	-	-	60	40	-	-	-	100	-	-	4	2	Offline	SO	
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	-	-	50	-	-	2	1	Interactive	SO	
<b>Total</b>				<b>200</b>	<b>40</b>	<b>80</b>	<b>80</b>	<b>290</b>	<b>100</b>	<b>60</b>	<b>25</b>	<b>75</b>	<b>950</b>	<b>14</b>	<b>01</b>	<b>12</b>				
8.	1000007	MAC	Intellectual Property Rights (IPR)	50	10	20	20	-	-	-	-	-	100	2	-	-	GRADE	Online	MCQ	

**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**

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

MCQ: Multiple Choice Question

AO: Assignment + Oral

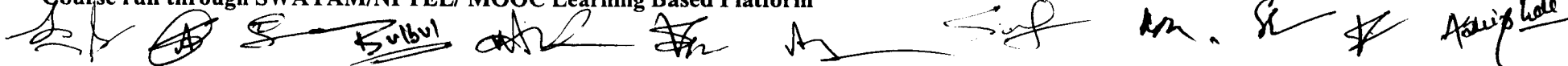
PP: Pen Paper

SO: Submission + Oral

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

Mode of Teaching					Mode of Examination					Total Credits
Theory			Lab	NEC	Theory			Lab	NEC	
Offline	Online	Blended	Offline	Interactive	PP	AO	MCQ	SO	SO	
00	03	12	05	01	12	00	03	05	01	21
00%	14.29%	57.14%	23.81%	4.76%	57.14%	00%	14.29%	23.81%	4.76%	Credits %

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



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DE -1*		
S. No.	Subject Code	Subject Name
1.	160661	Introduction To Internet Of Things (12 Weeks)
2.	160664	Foundation of Cloud IoT Edge ML (8 Weeks)
3.	160665	Cloud Computing and Distributed Systems (8 Weeks)

OC-1		
S. No.	Subject Code	Subject Name
1.	910103	Software Engineering
2.	910124	Networking with TCP/IP
3.	910125	Cryptography & Network Security

## List of courses to be opted for Minor specialization in B. Tech VI Semester

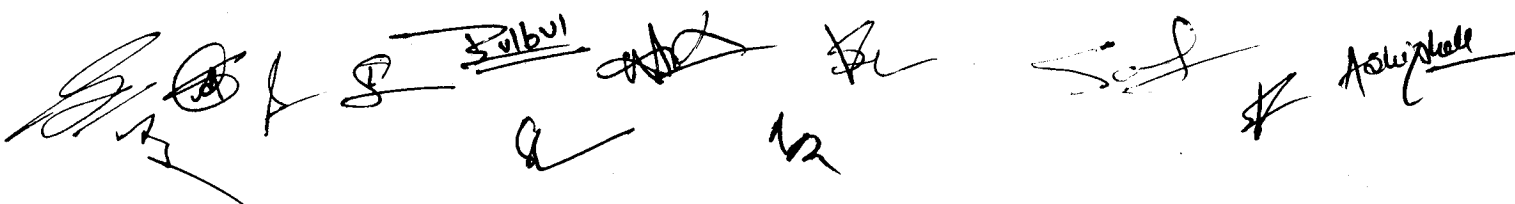
Minor specialization*	
<i>(to be opted by students of Other Department)</i>	
Course Code	Course Name
IT0521M2	Programming in Java (12 Weeks)
IT0620M2	Programming, Data Structures and Algorithms in Python (8 Weeks)
IT0621M1	Design and analysis of algorithms (8 Weeks)
IT0623M1	Introduction to Database Systems (12 Weeks)

## List of courses to be opted for Honours specialization in B. Tech VI Semester

Honours*		
<i>(to be opted by students of Parent Department)</i>		
Specialization 1: Artificial Intelligence and Machine Learning	Specialization 2: Data Analytics	Specialization 3: Robotics
Course Name	Course Name	Course Name
Machine Learning for Engineering and science applications (12 Weeks)	Data Science for Engineers (8 Weeks)	Embedded Systems Design (12 weeks)
AI:Constraint Satisfaction (8 Weeks)	Business Intelligence & Analytics (12 weeks)	AI:Constraint Satisfaction (8 Weeks)

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

**Note:** In each semester (starting from V to VIII semester), it is required to opt for new subjects towards Honours Degree/ Minor Specialization.



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**ANNEXURE - IV**

***Syllabi***  
***Of***  
***Departmental Core Courses (DC)***  
***B. Tech VI Semester***  
***(Batch Admitted in 2021-22)***  
***(Information Technology)***  
***Under Flexible Curriculum***  
***[ITEM IT -7]***

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Department of Information Technology

**COMPILER DESIGN**  
**160615**

L	T	P	Total Credits
2	1	2	4

**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, Translator, Interpreter and Assembler, Overview and use of Linker and Loader, 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 and Intermediate code:** Syntax-Directed Translation Schemes, Implementation of Syntax-Directed Translators, Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Memory Allocation

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Department of Information Technology

**DATA MINING & PATTERN WAREHOUSING**  
**160616**

L	T	P	Total Credits
3	-	2	4

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

**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.

**Unit - III**

**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

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**ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**  
**160617**

L	T	P	Total Credits
3	-	2	4

**COURSE OBJECTIVES:**

- To provide the fundamental knowledge of Artificial Intelligence and Machine Learning.
  - To present the basic representation and reasoning paradigms used in AI & ML.
  - To understand the working of techniques used in AI & ML.
- 

**Unit I**

**Introducing Artificial Intelligence:** Definition, Goals of AI, Task of AI, Computation, Psychology and Cognitive Science, Perception, Understanding and Action, Artificial Intelligence v/s Machine Learning v/s Deep Learning and other related fields, Applications of Artificial intelligence and Machine Learning in real world.

**Unit II**

**Problem, Problem Space and Search:** Production System, Blind Search: BFS & DFS, Heuristic Search, Hill Climbing, Best First Search. **Introduction to Neural Networks:** History, Biological Neuron, Artificial Neural Network, Neural Network Architectures, Classification, & Clustering.

**Unit III**

**Introduction to Machine Learning:** Traditional Programming v/s Machine Learning. **Key Elements of Machine Learning:** Representation, Process (Data Collection, Data Preparation, Model Selection, Model Training, Model Evaluation and Prediction), Evaluation and Optimization, **Types of Learning:** Supervised, Unsupervised and Reinforcement Learning, Regression vs Classification Problems.

**Unit IV**

**Supervised Machine Learning:** Linear Regression: Implementation, Applications & Performance Parameters, Decision Tree Classifier, Terminology, Classification v/s

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Regression Trees, Tree Creation with Gini Index and Information Gain, ID3 Algorithms, Applications and Performance Parameters, Random Forest Classifier, Case Study on Regression and Classification for solving real world problems.

### Unit V

**Unsupervised Machine Learning:** Introduction, Types: Partitioning, Density Based, DBSCAN, Distribution Model-Based, Hierarchical, Agglomerative and Divisive, Common Distance Measures, K-Means Clustering Algorithms, Case Study on Clustering for solving real world problems.

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### RECOMMENDED BOOKS:

- Artificial Intelligence: A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
- Introduction to AI & Expert System: Dan W. Patterson, PHI.
- Pattern Recognition and Machine Learning, Christopher M. Bishop
- Introduction to Machine Learning using Python: Sarah Guido
- Machine Learning in Action: Peter Harrington

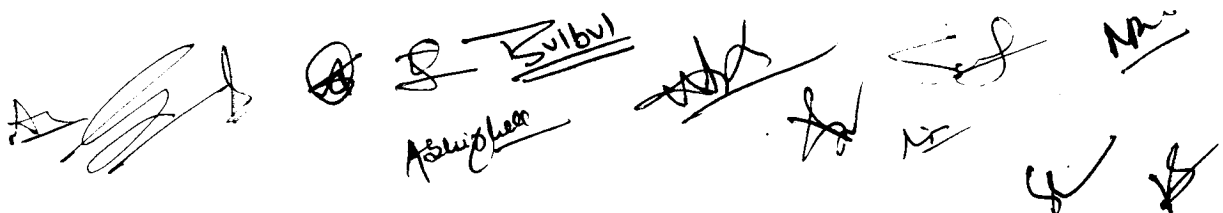
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### COURSE OUTCOMES

after completing the course, the student will be able to:

- CO1. describe existing approaches in Artificial Intelligence, ANN and machine Learning.
- CO2. distinguish various techniques for data search and processing.
- CO3. differentiate different machine learning problems and techniques.
- CO4. apply AI and ML techniques to solve real-world problems.
- CO5. analyze supervised and unsupervised techniques.

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**ANNEXURE - V**

*Syllabi*  
*Of*  
*Open Category (OC) Courses*  
*B. Tech VI Semester*  
*(Batch Admitted in 2021-22)*  
*(Information Technology)*  
*Under Flexible Curriculum*  
*[ITEM IT -9]*

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Department of Information Technology

**SOFTWARE ENGINEERING**  
**910103**

L	T	P	Total Credits
3	-	-	3

**COURSE OBJECTIVES**

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

**Unit - I**

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

**Unit - II**

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

**Unit - III**

**Design Concept, Principle and Methods:** Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural

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Department of Information Technology

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 (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.

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**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.

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**COURSE OUTCOMES**

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

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

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**NETWORKING WITH TCP/IP**  
**910124**

L	T	P	Total Credits
3	-	-	3

**COURSE OBJECTIVES**

- To build an understanding of the fundamental concepts of TCP/IP with computer networking.
- To familiarize the student with the basic taxonomy and terminology of the TCP/IP area.
- To understand the network traffic, congestion, controlling and resource allocation.

**Unit-I**

**Introduction:** ARPANET, ISDN and Broadband ISDN, Protocols and Standards, Internet Administration, ATM Model, SONET & SDH, TCP/IP Protocol Suite, Network Addressing at various layer

**Unit-II**

**IP Layer:** Connection Oriented & Connection less Internet Working, IPV4 Addressing, Subnetting, Supernetting. Delivery and Forwarding of IP Packets, IPv4, IPv6, ARP, RARP, ICMPv4, IGMP, Mobile IP, Unicast Routing Protocols (RIP, OSPF, and BGP), Multicasting and Multicast Routing Protocols

**Unit-III**

**TCP and UDP Layer:** TCP Reliable data transfer, Connection Establishment & Release, TCP Frame, Header Checksum, Sliding Window Concept for error control, congestion control and TCP timer, UDP Format, Pseudo header, Encapsulation, Checksum, Multiplexing & Demultiplexing. Stream Control Transmission Protocol

**Unit-IV**

**Application Layer:** Client-Server Paradigm, DHCP, DNS, TELNET, FTP, TFTP, World Wide Web and HTTP, Electronic Mail: SMTP, POP, IMAP, and MIME, SNMP, BOOTP

**Unit-V**

**Multimedia and Next Generation Protocol:** Voice over IP, Real Time Transport Protocol, IPv6 Addressing, IPv6 Protocol, ICMPv6, Firewall, PGP, HTTPS.

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## RECOMMENDED BOOKS

- Data and Computer Communication, W. Stalling, Pearson.
- Internetworking with TCP/IP - Vol. – I, D.E. Comer, PHI.
- Data Communication & Networking, B.A. Forouzan.
- ISDN and Broad band ISDN with Frame Relay & ATM, W. Stalling.

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## COURSE OUTCOMES

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

- CO1. describe the fundamentals of computer networking protocols.
- CO2. elaborate IP addresses and their role in routing data packets.
- CO3. analyze connection-oriented and connection-less data transmission protocols.
- CO4. distinguish various protocols at application layer.
- CO5. illustrate different multimedia and next generation protocols.

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**CRYPTOGRAPHY & NETWORK SECURITY**  
**910125**

L	T	P	Total Credits
3	-	-	3

**COURSE OBJECTIVES**

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

**Unit-I**

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

**Unit-II**

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

**Unit-III**

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

**Unit-IV**

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

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

### Unit -V

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

---

### RECOMMENDED BOOKS

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

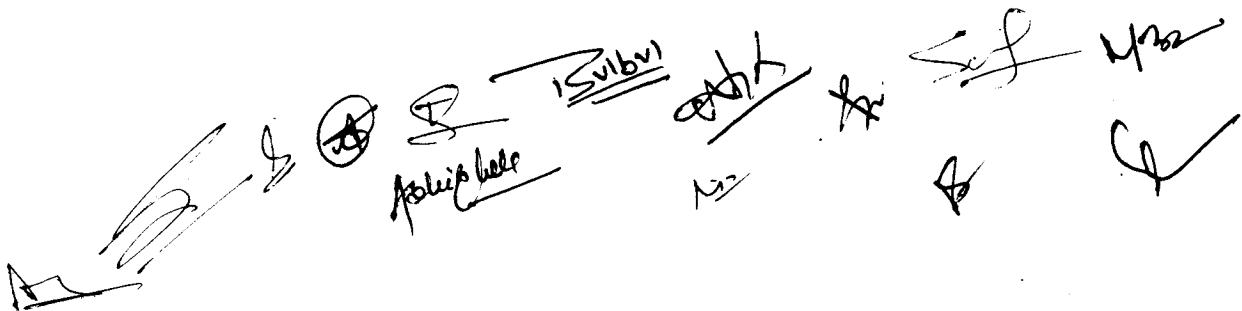
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### COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. describe fundamentals of cryptographic algorithms and number theory.
- CO2. distinguish numerous symmetric and asymmetric cryptography algorithms.
- CO3. analyze various concepts of message digest and hash function.
- CO4. explain the concept of IP and web security measure.
- CO5. illustrate different types attacks and hackers in phishing.

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***Experiments List / Lab manuals***  
***of***  
***Laboratory Courses***  
***B. Tech VI Semester***  
***(Batch Admitted in 2021-22)***  
***(Information Technology)***  
***Under Flexible Curriculum***  
***[ITEM IT -10]***

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**COMPILER DESIGN LAB**  
**160615**

**LIST OF PROGRAMS**

1. Write a program to convert NFA to DFA.
2. Write a program to minimize DFA.
3. Develop a lexical analyzer to recognize a few patterns.
4. Write a program to parse using Brute force technique of Top down parsing.
5. Develop LL (1) parser (Construct parse table also).
6. Develop an operator precedence parser (Construct parse table also).
7. Develop a recursive descent parser.
8. Write a program for generating for various intermediate code forms.
  - i. Three address code
  - ii. Polish notation
9. Write a program to simulate Heap storage allocation strategy.
10. Generate Lexical analyzer using LEX.
11. Generate YACC specification for a few syntactic categories.
12. Given any intermediate code form implement code optimization techniques.

---

**COURSE OUTCOMES**

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

- CO1. implement various parsing techniques.
  - CO2. demonstrate different types of compiler tools
  - CO3. develop programs for implementing code optimization techniques.
  - CO4. build symbol table and intermediate codes.
  - CO5. analyze the functionalities of different phases of the compilation process.
- 

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Department of Information Technology

## DATA MINING & PATTERN WAREHOUSING LAB

160616

### LIST OF PROGRAMS

1. To perform basic operation for mining data (Preprocessing, Regression, Classification, Association, Clustering and Visualization) using WEKA simulator
2. Setting up a flow to load an ARFF file (batch mode) and perform a cross validation using J48 (WEKA's C4.5 implementation).
3. Draw multiple ROC curves in the same plot window for J48 and Random Forest as classifiers using Knowledge flow in WEKA.
4. Training and Testing of Naive Bayes classifier incrementally using Knowledge flow in WEKA.
5. Write a program to count the occurrence frequency of items in the given data set.
6. Write a program to generate frequent itemset from given data set.
7. Write a program to generate Association rules from the generated frequent itemsets.
8. Write a program to implement of various Association Rule Mining algorithms such as Apriori, ECLAT, FP growth and FP Tree.
9. Write a program to implement different type of clustering algorithms such as K-Mean, Hierarchical, DBSCAN and EM Clustering.

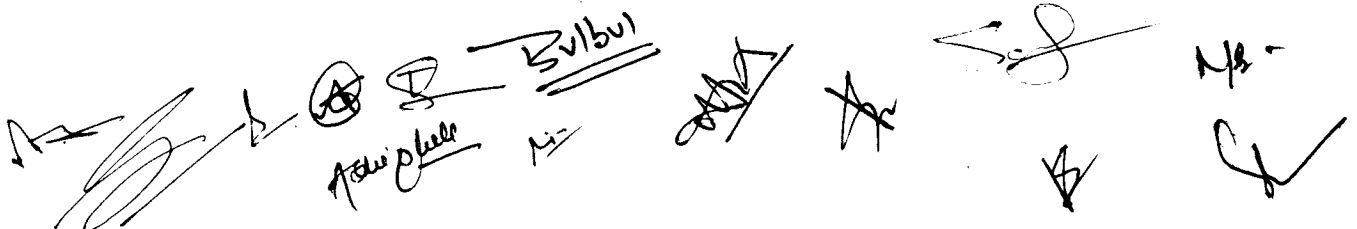
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### COURSE OUTCOMES

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

- CO1. build the concepts of conceptualization/class description and association analysis.
- CO2. implement cluster analysis using various methods.
- CO3. demonstrate issues related to classification, prediction, and cluster analysis.
- CO4. create a process flow for pattern warehousing.
- CO5. develop real-world applications using data mining techniques.

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Department of Information Technology

**ARTIFICIAL INTELLIGENCE & MACHINE LEARNING LAB**  
**160617**

**LIST OF PROGRAMS**

1. Study of PROLOG programming language and its functions.
2. Write simple fact for the statements using PROLOG
3. WAP to implement factorial, Fibonacci of a given number using PROLOG.
4. Write a program to solve the 4-Queen problem using PROLOG and Python both.
5. Explore numpy, Pandas, SciPy, Matplotlib and Scikit Learn libraries in Python
6. Study and implement various Dimensionality reduction, Feature selection and Normalization techniques in Python
7. Implement Linear Regression model in Python.
8. Implement Logistic Regression model in Python.
9. Implement decision tree Classification Model using C4.5 and CSRT algorithms in Python.
10. Implement K-means clustering technique.
11. Implement Fuzzy C-means clustering technique.
12. Study various performance parameters used for evaluating the performance of various regression, classification and clustering models.

---

**COURSE OUTCOMES**

After completing the course, the student will be able to:

- CO1. apply the concepts of PROLOG programming language.
- CO2. implement different techniques for knowledge representation and processing.
- CO3. evaluate numerous Artificial Intelligence & Machine Learning techniques over various performance parameters.
- CO4. demonstrate various techniques for data search and processing.
- CO5. build AI enabled intelligent systems for solving real-world problems.

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**ANNEXURE - VII**

***Skill Based Micro, Macro and Mini-Project  
of  
Laboratory Courses  
B. Tech VI Semester  
(Batch Admitted in 2021-22)  
(Information Technology)  
Under Flexible Curriculum  
[ITEM IT -11]***

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**COMPILER DESIGN LAB**  
**160615**

**LIST OF PROJECTS**

**SKILL BASED MICRO PROJECTS**

1. Study of JFLAP (Java Formal Languages and Automata Package) tools.
2. Design a Program to recognize constant.
3. Design a Program to recognize keyword.
4. Design a Program to recognize identifier.
5. Design a Program to recognize operator.
6. Design a program to recognize identifier.
7. Design a Program to recognize a delimiter/punctuators.

**Note:** Use JFLAP (Java Formal Languages and Automata Package) tools.

**SKILL BASED MACRO PROJECTS**

1. Convert finite automata to regular expression.
2. Convert regular expression to finite automata.
3. Convert CFG to PDA (LL).
4. Convert CFG to PDA (LR).
5. Convert Regular Grammar to FSA
6. Build LL(1) parsing table.
7. Build SLR(1) parsing table.

**Note:** Use JFLAP (Java Formal Languages and Automata Package) tools.

**SKILL BASED MINI PROJECTS**

1. Design a Lexical scanner to recognize keyword, identifier and its total count presented in source program.
2. Design a Lexical scanner to identify operators, digits (0-9) and numbers (like integer, floating point, fractional and exponential) in source program.

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3. Design a Lexical scanner to count no. of words, character, small characters, capital characters and capital words within source program.
  4. Design a Lexical analyzer to ignore comments, redundant spaces, tabs and new lines form input source program.
  5. Design a Lexical scanner to recognize and count the number of vowels and consonants in a sentence.
  6. Design a YACC analyzer to implement a Calculator and recognize a valid Arithmetic expression.
  7. Design a YACC analyzer to recognize string with grammar  $\{a^n b^n \mid n \geq 0\}$  and  $\{a^n b \mid n \geq 5\}$ .
  8. Design a YACC that accepts strings that starts and ends with Zero or One.
- 

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**DATA MINING & PATTERN WAREHOUSING LAB**  
**160616**

**LIST OF PROJECTS**

**SKILL BASED MICRO PROJECTS**

1. Application in real estate industries to predict the prices.
2. Detecting Phishing website using data mining techniques.
3. Design a framework for Intelligent Transport System.
4. Write a program for Credit Card Fraud Detection System.
5. Implement the system to perform Opinion Mining for Social Networking Site.

**SKILL BASED MACRO PROJECTS**

1. Implement and analyze Customer segmentation in retail.
2. Write a program to Predicting house prices.
3. Develop a program for healthcare fraud detection.
4. Write a program for Recommending movies to users.
5. Analyze and design for Predicting student performance.

**SKILL BASED MINI PROJECTS**

1. Write a program for Weather forecasting using Data Mining Technique.
2. Develop a program for Stock Market Analysis and Prediction.
3. Write a program for Online book recommendation system using Collaborative filtering.
4. Implement and analyze for Customer behavior prediction using web usage mining.
5. Design a program for Secure E Learning Using Data Mining Techniques.

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**ARTIFICIAL INTELLIGENCE & MACHINE LEARNING LAB**  
**160617**

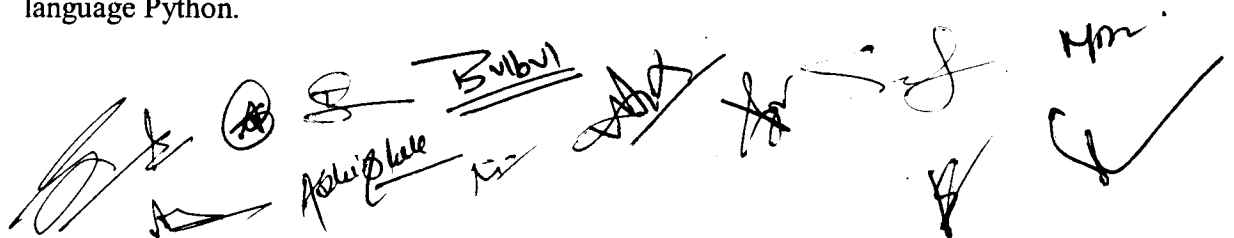
**LIST OF PROJECTS**

**SKILL BASED MICRO PROJECTS**

1. Define and explore the tools available on machine learning using python.
2. Analyze various Artificial Intelligence & Machine Learning techniques over various performance parameters.
3. Compare and contrast Artificial Intelligence, Machine Learning, and Deep Learning. Explore related fields and their applications in real-world scenarios.
4. Apply heuristic search techniques like Hill Climbing and Best First Search to solve a problem.
5. Explore neural networks by implementing a basic artificial neural network architecture. Understand classification and clustering concepts.
6. Build a Decision Tree Classifier using Gini Index and Information Gain. Compare it with the ID3 algorithm and evaluate its performance.
7. Implement a Random Forest Classifier and perform a case study on regression and classification for solving real-world problems.
8. Apply DBSCAN and Hierarchical Clustering algorithms to real-world datasets. Discuss the advantages and limitations of each.

**SKILL BASED MACRO PROJECTS**

1. Implement Breadth-First Search (BFS) and Depth-First Search (DFS) algorithms for a given problem space.
2. Develop a heuristic search algorithm and compare its performance with blind search algorithms.
3. Implement Hill Climbing and Best First Search algorithms for optimization problems.
4. Create a simple artificial neural network for a classification problem using a programming language Python.



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5. Explore and implement different neural network architectures (feedforward, recurrent, etc.) and observe their impact on learning.
6. Implement Linear Regression for predicting a continuous variable, analyze its applications, and evaluate performance parameters.
7. Build a Decision Tree Classifier, compare classification and regression trees, and assess performance using Gini Index and Information Gain.
8. Create and analyze a Random Forest Classifier for improved accuracy and robustness.
9. Implement K-Means Clustering Algorithm for partitioning data and solve a clustering problem in a real-world scenario.
10. Explore and implement DBSCAN and Hierarchical Agglomerative Clustering for density-based and hierarchical clustering, respectively.
11. Apply clustering algorithms to a real-world dataset and evaluate their effectiveness using common distance measures.

**SKILL BASED MINI PROJECTS**

1. Apply K-Means clustering algorithm to segment customers based on their purchasing behavior.
  - a. Obtain a dataset related to customer transactions or preferences.
  - b. Perform data preparation and exploration.
  - c. Implement the K-Means clustering algorithm for customer segmentation.
  - d. Visualize the clustered groups and analyze their characteristics.
  - e. Propose potential marketing strategies tailored to each customer segment.
2. Build a predictive model using a supervised machine learning algorithm (e.g., Linear Regression, Decision Tree, Random Forest) for a real-world problem.
  - a. Select a real-world dataset suitable for regression or classification.
  - b. Perform data collection and pre-processing.
  - c. Implement and train the chosen supervised learning algorithm.
  - d. Evaluate the model using appropriate performance parameters.
  - e. Create a comprehensive report on the entire process, including challenges faced and lessons learned.

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3. Build a basic neural network from scratch using python and train the neural network for a simple classification task.
  4. Predictive Modeling with Regression
    - a. Use linear regression to predict a numerical outcome based on a set of input features.
    - b. Evaluate the model's performance and interpret the results.
  5. Ensemble Learning with Random Forest
    - a. Implement a Random Forest classifier for a given dataset.
    - b. Compare the performance of the Random Forest model with a single decision tree.
  6. DBSCAN for Anomaly Detection
    - a. Implement DBSCAN for detecting anomalies or outliers in a dataset.
    - b. Evaluate the effectiveness of DBSCAN in identifying unusual patterns.
- 

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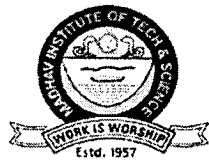
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**ANNEXURE - VIII**

*Scheme and Syllabi*  
*of*  
*B. Tech IV Semester*  
*(Batch Admitted in 2022-23)*  
*(Information Technology)*  
*Under Flexible Curriculum*  
*[ITEM IT -12]*



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### Scheme of Evaluation

#### B. Tech. IV Semester (Information Technology) (for batch admitted in academic session 2022-23)

*MK*  
23/01/23  
DEAN (ACADEMICS)  
MITS

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Exam	Duration of Exam	
				Theory Slot				Practical Slot				L	T	P				
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation									
				End Sem. Exam	Proficiency in subject/course	Mid Sem. Exam.	Quiz/Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	2100003	BSC	Engineering Mathematics- III	50	10	20	20	-	-	-	100	2	1	-	3	Online	PP	2 Hrs
2.	2160421	DC	Microprocessor & Interfacing	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
3.	2160422	DC	Software Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ	1.5 Hrs
4.	2160423	DC	Theory of Computation	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
5.	2160424	DC	Cryptography & Network Security	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
6.	2160425	DLC	Design and Thinking Lab using Arduino	-	-	-	-	60	20	20	100	-	-	2	1	online	SO	-
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO	-
<b>Total</b>				<b>250</b>	<b>50</b>	<b>100</b>	<b>100</b>	<b>230</b>	<b>60</b>	<b>60</b>	<b>850</b>	<b>11</b>	<b>04</b>	<b>08</b>	<b>19</b>	-	-	-
8.	3000004	Natural Sciences & Skills	Language	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs
9.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs

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

Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language

Credits of Natural Sciences & Skills will be added in the VI Semester

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

Theory				Mode of Examination			Total Credits		
Offline	Blended	Lab	NEC	Theory	Lab	NEC			
03	12	03	01	PP	MCQ	SO			
15.79%	63.16%	15.79%	5.26%	63.16%	-	15.79%	15.79%	5.26%	19
Credits %									

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**MICROPROCESSOR & INTERFACING**  
**2160421**

L	T	P	Total Credits
2	1	2	4

**COURSE OBJECTIVES**

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

**Unit-I**

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

**Unit-II**

**Basic Peripherals and Interfacing:** 8212, XXXX, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors XXXXXXXXXX Memory Interfacing.

**Unit-III**

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

**Unit-IV**

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

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### Unit-V

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

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### RECOMMENDED BOOKS

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

### COURSE OUTCOMES

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

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

*Asheesh*  
*Bulbvi*  
*Mr. S. J. M.*  
*Mr. C.*



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### Unit - IV

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

### Unit - V

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

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### RECOMMENDED BOOKS

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

---

### COURSE OUTCOMES

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

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

---

*Aswini Chandel*  
*Rajib Mall*  
*PHI*  
*McGraw Hill*  
*New Age*  
*Sommerville*  
*Pressman*  
*Agarwal & Singh*  
*Mall*  
*PHI*

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**THEORY OF COMPUTATION**  
**2160423**

L	T	P	Total Credits
2	1	-	3

**COURSE OBJECTIVE**

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

**Unit-I**

**Introduction of Automata Theory:** Examples of Automata Machines, Finite Automata as a Language Acceptor and Translator, Moore Machines and Mealy Machines, Conversion from Mealy to Moore and vice versa, [REDACTED].

**Unit-II**

**Types of Finite Automata:** Non Deterministic Finite Automata (NFA), Deterministic Finite Automata Machines, Conversion of NFA to DFA, Minimization of Automata Machines, Regular Expression, Arden's theorem, Meaning of Union, Intersection, Concatenation and Closure, 2 way DFA.

**Unit-III**

**Grammars:** Chomsky Hierarchy of Grammar, [REDACTED]  
[REDACTED] Derivation Trees, Ambiguity in Grammar, Simplification of Context Free Grammar, Conversion of Grammar to Automata Machine and Vice Versa, [REDACTED], Chomsky Normal Form and Greibach Normal Form.

**Unit-IV**

**Push down Automata:** Example of PDA, Deterministic and Non-Deterministic PDA, Conversion of PDA into Context Free Grammar and Vice Versa, CFG Equivalent to PDA, Petrinet Model.

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**CRYPTOGRAPHY & NETWORK SECURITY**  
**2160424**

L	T	P	Total Credits
3	-	-	3

**COURSE OBJECTIVES**

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

**Unit-I**

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

**Unit-II**

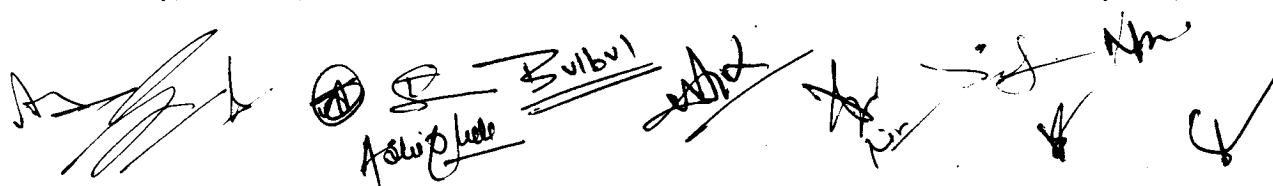
**Cryptography:** Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

**Unit-III**

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

**Unit-IV**

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



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

### 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.

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### 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 Prosise, Tata McGraw Hill.

---

### COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. define cryptographic algorithms, hash algorithms and authentication mechanisms.
  - CO2. explain 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. select the attacks and controls associated with IP, transport-level, web and e-mail security.
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**ANNEXURE - IX**

*Experiments List / Lab manuals  
of  
Laboratory Courses  
B. Tech IV Semester  
(Batch Admitted in 2022-23)  
(Information Technology)  
Under Flexible Curriculum  
[ITEM IT -13]*

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## MICROPROCESSOR & INTERFACING LAB

2160421

### LIST OF EXPERIMENTS

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

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15. Write an ALP to separate positive and negative numbers using 8085/8086 instruction set.
  16. Write an ALP to transfer of a string in forward direction using 8086 instruction set.
- 

**COURSE OUTCOMES**

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

- CO1. identify the Hex code/ Machine code of instructions in assembly language.
  - CO2. perform interfacing of various peripheral devices and memory with the microprocessor.
  - CO3. demonstrate the arithmetic & Logical operation using the instruction set of the 8086 microprocessor.
  - CO4. implement 8085/8086 for interfacing with I/O devices.
  - CO5. build the assembly language programs in 8085/8086 to solve real-world problems.
- 

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**SOFTWARE ENGINEERING**

**2160422**

## LIST OF EXPERIMENTS

### **Experiment 1: Identify the requirements from problem statements**

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

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

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

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

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

### **Experiment 4: E-R modeling from the problem statements**

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

### **Experiment 5: Modeling UML Class diagrams and Sequence diagrams**

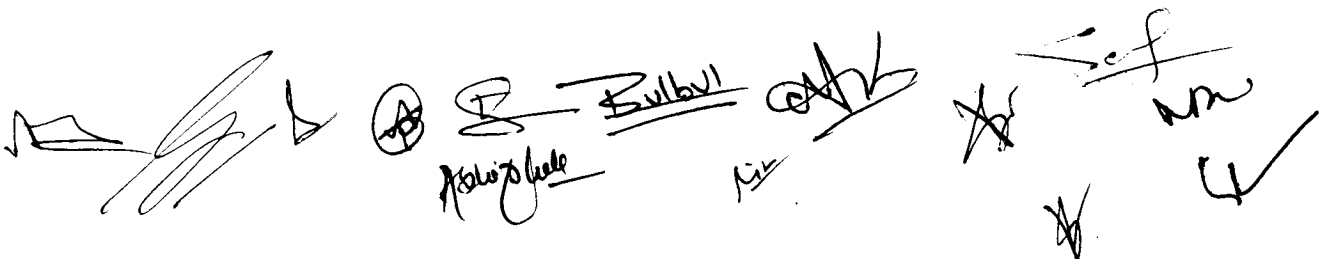
Structural and Behavioral aspects, Class diagram, Elements in class diagram, Class, Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages.

### **Experiment 6: Modeling Data Flow diagrams**

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

### **Experiment 7: Modeling Flow Chart**

Flow Chart, Graphical notations for Flow Chart, Explanation of Symbols used in Flow Chart.



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### Experiment 8: Estimation of Test coverage metrics and structural complexity

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

### Experiment 9: Designing Test Suites

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

---

### RECOMMENDED TOOLS

- Selenium
- Star UML
- UMLet
- Raptor

### REFERENCE

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

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### COURSE OUTCOMES

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

- CO1. construct different types of UML diagrams.
  - CO2. build the test scenarios and test cases for the different software applications.
  - CO3. develop the requirement and design document specification.
  - CO4. apply the techniques for software project management & estimation.
  - CO5. design the software using modern tools and technologies.
- 

*Handwritten signatures and initials:*  
Amit Patel  
Subvi  
Mishra  
S. J.  
M.

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**DESIGN AND THINKING LAB USING ARDUINO**  
**2160425**

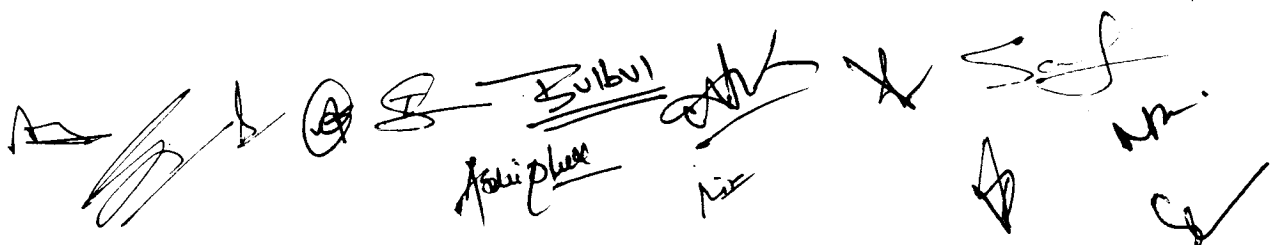
**LIST OF PROGRAMS**

1. Introduction to Arduino Board and Arduino IDE (Installation and Setup)
  2. Write a Program to Blink LED (Turn an LED on and off).
  3. Write a Program to demonstrate the use of analog output to fade an LED.
  4. Write a Program to read an analog input and print the voltage to the serial monitor.
  5. Write a Program to count the number of button pushes.
  6. Write a Program to Control an LED using Button.
  7. Write a program to detect objects using IR Obstacle Sensor.
  8. Write a program to detect the presence of Gas using a GAS Sensor.
  9. Write a Program to Control Electronic Appliances using RELAY SHIELD Sensor.
  10. Write a Program to measure Temperature and Humidity using DHT11 Sensor.
  11. Write a program to detect motion using Motion Sensor (PIR sensor).
  12. Write a Program to detect presence of smoke using Smoke Sensor.
  13. Write a program to interface a range sensor with an arduino board and understand the principle behind an ultrasonic range sensor.
  14. Write a program to interface DHT11 and Range sensor using a single board.
- 

**COURSE OUTCOMES**

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

- CO1. develop the ability to correctly identify various components/sensor.
  - CO2. construct a functional circuit involving both LED, button components and sensor.
  - CO3. demonstrate practical proficiency by programming a system that responds to detected motion and effectively manages connected devices
  - CO4. develop smart real time system applications.
- 

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**ANNEXURE - X**

***Skill Based Micro, Macro and Mini-Project***  
***of***  
***Laboratory Courses***  
***B. Tech IV Semester***  
***(Batch Admitted in 2022-23)***  
***(Information Technology)***  
***Under Flexible Curriculum***  
***[ITEM IT -14]***



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## MICROPROCESSOR & INTERFACING LAB

2160421

### LIST OF PROJECTS

#### SKILL BASED MICRO PROJECTS

1. Store 8-bit data in memory
2. Store 8-bit data in memory using indirect addressing
3. Illustrate the Branch instructions
4. Set the flag registers
5. Show the values after increment and decrement the register

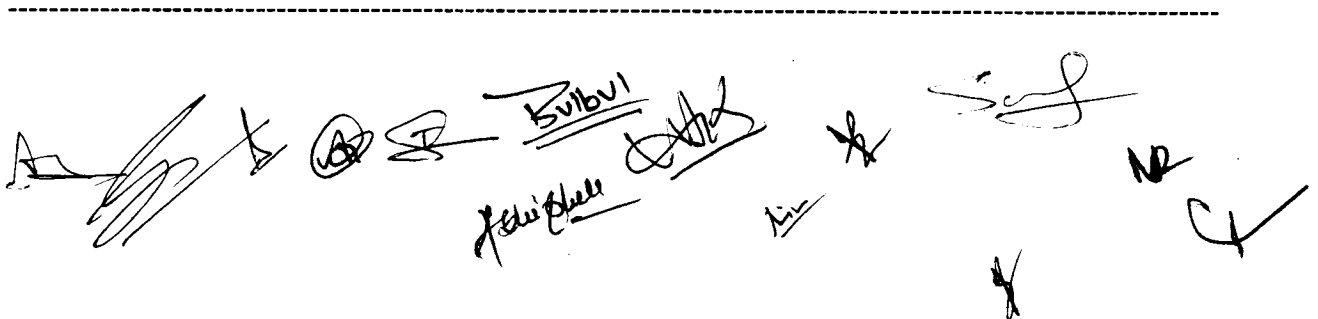
#### SKILL BASED MACRO PROJECTS

1. Finding 1's complement of a number
2. Finding 2's complement of a number
3. Illustrate the CMP and CPI instruction
4. Set the control word register using PPI.

#### SKILL BASED MINI PROJECTS

1. Traffic light controller using 8085/8086 microprocessor.
2. Night light saver using 8085/8086 microprocessor.
3. Interfacing 8085 with Stepper Motor controller.
4. Interfacing 8085 with DC motor controller.
5. Interfacing 8085 with keypad.
6. Interfacing 8085 with Seven-Segment Display.
7. Interfacing 8085 with switches.
8. Interfacing 8085 with ADC.
9. Interfacing 8085/8086 with 8255 PPI.
10. Interfacing 8085/8086 with 8251.

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**SOFTWARE ENGINEERING**  
**2160422**

**LIST OF PROJECTS**

**SKILL BASED MICRO PROJECTS**

1. Design the 25 test scenarios for WhatsApp application.
2. Design the defect table by using the defect report template for the WhatsApp application.
3. Do a case study on StarUML (Software engineering tool for system modeling using the UML).
4. Do a case study on Raptor.

**SKILL BASED MACRO PROJECTS**

1. Design an Activity diagram by considering any application/software as an example.
2. Design a State-Transition diagram by considering any application/software as an example.
3. Design a Communication diagram by considering any application/software as an example.

**SKILL BASED MINI PROJECTS**

**Note:** In every project students must have to

- Design the SRS of the project.
- Draw the various ER diagram, DFD and Use Case diagram of the project.
- Design the test case of the project.

**Mini Skill Project 01**

**Delivery Agent System**

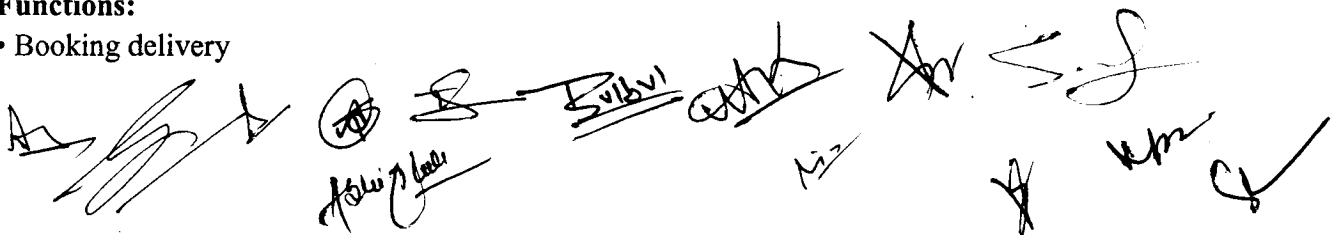
There are many online shopping portals such as Flipkart, Amazon, Snapdeal, etc. are active in the Indian market. One major task is to deliver an online books T-shirt to the customers as first as possible in a cost-effective (cheapest) manner. A delivery agent system, which would automatically receive a delivery request from an online portal and identify the couriers, whom the delivery job can be assigned.

**Input:**

- Shipping details (source and destination) locations
- Couriers' details in different localities.
- Service offering for each courier company.

**Functions:**

- Booking delivery



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- Status of delivery
- Cancellation of booking

### Output:

- Booking confirmation, if booking is successful.
- Reporting delivery status
- Cancellation of booking confirmation

### Mini Skill Project 02

#### Payroll Management System (PMS)

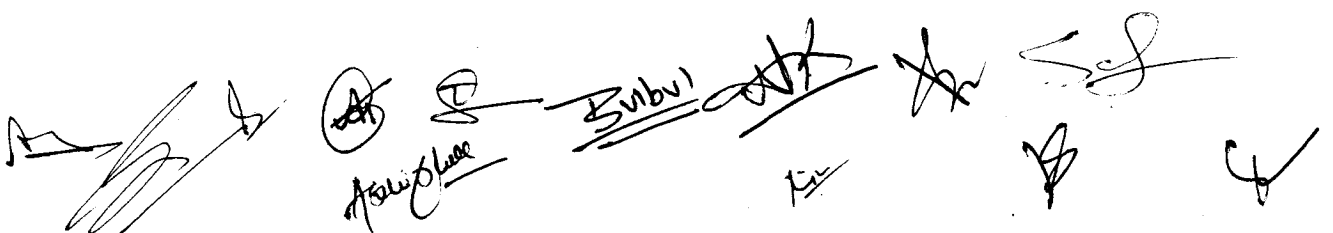
The Employee and Payroll Systems objective is to provide a system which manages the employee details, the Payroll activity done in a company depending upon the employees attendance and its calculation which is very huge. The users will consume less amount of time through computerized system rather than working manually. The system will take care of all the payroll activities like managing each employee's attendance, the number of leaves taken by that particular employee and calculation in a very quick manner and it avoids Data storing is easier. Paper work will be reduced and the company staffs spend more time on monitoring the progress. The system is user friendly and easy to use. All the important data's will be stored in the database and it avoids any miscalculation. The "Employee and Payroll System "is based on maintaining each employee records and calculating his/her salary depending on the workdays. The first activity is based on saving the employees details where each employee will be given a unique Employee ID. Now based on the no of days an employee attended per month, salary will be calculated by checking the no of workdays of a company and his/her basic salary and a separate salary slip will be provided for reference.

#### Inputs:

- Employee details (employee no, name, address, designation, department, achievements)
- Accounts details (salary of each employee, deduction, TA, DA, HRA, other allowance, PF)
- Leave information (no of leave taken by each employee)

#### Output:

- Salary slip
- Detailed salary report
- Deduction details
- Leave information

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### Mini Skill Project 3

#### **Online Toll Plaza System**

Now-a-days, cashless transaction is becoming popular among the users because it is easy to handle, and it does not require to carry cash in hand. Typically, in India, road tolls are collected from cars manually for which the cars need to stop to pay the toll fee. In contrast, the objective is to make the system Online, so that the toll fee is automatically deducted from the user. Therefore, users credit their Online account (consider this as eWallet), and money is automatically deducted when the cars pass the toll system. As a result, the users do not have to wait for manual toll fee payment. Concurrently, administrator can also view all transactions from anywhere. Finally, the administrator can view the total income in a day-to-day basis, and can also analyze the traffic pattern as well.

#### **Inputs:**

- User Information (Name, Car Number, Email Address, Password, Money in eWallet)
- Administrator Information (Email Address, Password)

#### **Operations:**

- User
  - Log-In
  - Credit in eWallet
  - Check eWallet Balance
  - Log-Out
- System
  - Check the car number
  - Required Fee Available
  - Allow the car to pass
  - Deduct money from eWallet
  - Required Fee NOT Available
  - Do Not Allow the car to pass
  - Fee Payment is done manually
  - Allow the car to pass
  - Total Income is stored in a database
- Administrator
  - Log-In
  - View transactions
  - View total income

#### **Outputs:**

- Display day-wise transactions to administrator
- User can view his/her own transactions

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### Mini Skill Project 04

#### **Online Examination System**

Now-a-days, Online examination system has become popular for competitive examinations because of its unique features such as auto-evaluation, speed and accuracy. Moreover, it also helps environments by reducing the use of paper. In such a system, students are asked to select answers from multiple options given for a single question. Likewise, there are several questions which appear in the students' systems. The questions and multiple options are saved in a database along with desired answers. Typically, a student can edit an answer after saving it, however, editing cannot be done after submitting the answer. Another user is also there – administrator. The administrator can create, modify and delete questions and accordingly, the question is updated in the system.

#### **Inputs:**

- Subject Information with Code, so that all subjects can be identified using unique codes.
- User Information
- If Student- Student Information (Name, Roll No, Email Address, Contact Number, Password)
- If Administrator (Email Address, Password)
- Set of Questions with multiple answers for each stored in a database along with desired answers.

#### **Operations:**

- Administrator
  - Log-In
  - CREATE, MODIFY or DELETE questions. Accordingly, the question set must be updated.
  - Log-Out
- Student
  - Log-In (Time starts)
  - Answer the questions – SAVE and SUBMIT
  - Log-Out (Automatically logged out after Timeout)

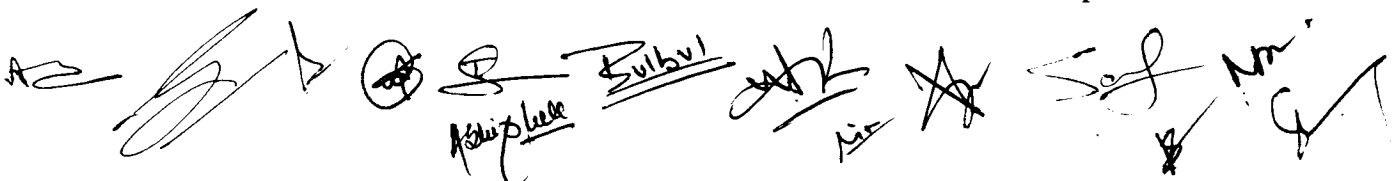
#### **Outputs:**

- Display the result in DESCENDING order according to obtained marks with Roll Number.
- The result is also saved into a database for future use.

### Mini Skill Project 5

#### **Online Health Monitoring System**

Online health monitoring or Online patient monitoring system (OHMS) is a promising technology to enable patient monitoring outside the conventional clinical system, i.e., the patient can be monitored remotely. Consequently, such system increases the access to care the patients and

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decreases the delivery cost related to healthcare. Typically, in OHMS, two type of users are there – doctors and patients. Different physiological parameters of the patient are monitored (using sensors), and the monitored data is stored in a server. The stored data is accessible from anywhere through user authentication. On the other hand, doctors can check the health status of a patient registered with the doctor. Therefore, the doctor can only access the physiological data of a patient if and only if he/she is registered with the doctor. Depending on the monitored values, adequate measures can be taken by the doctors. The patient can also view his/her health status. For authenticity, both the users need to login into the system.

### Inputs:

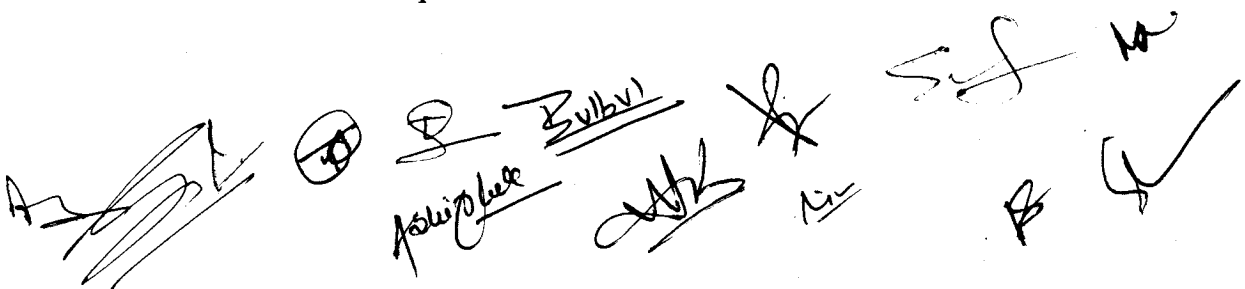
- User Information
- Doctor – (Name, Email Address, Password)
- Patient – (Name, Email Address, Password, DOB)
- Predefined Sensors (such as temperature, blood pressure and heart rate)

### Operations:

- Patient
  - Log-In
  - View health status
  - Ask doctor(s) to consult
  - Payment (Consultancy Fee)
  - Log-Out
- Doctor
  - Log-In
  - Monitor health status of registered patients to him/her
  - Ask patient(s) to consult
  - Log-Out

### Outputs:

- Display health status
- Consult with doctors/patients

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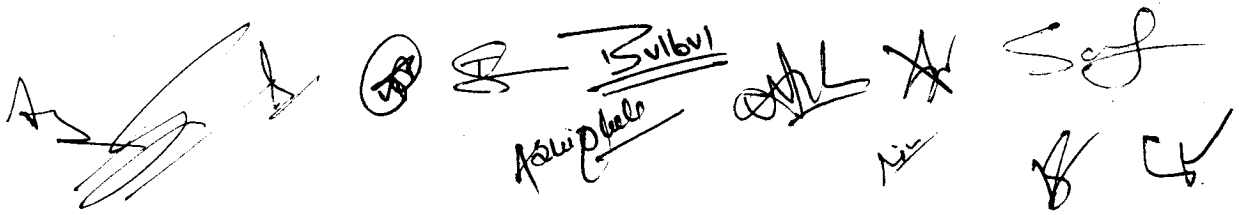
Department of Information Technology

**DESIGN AND THINKING LAB USING ARDUINO**  
**2160425**

**LIST OF PROJECTS**

**SKILL BASED MICRO PROJECTS**

1. **Blinking LED:** Use Arduino to program a simple LED to blink at different rates and Experiment with digitalWrite(), delay(), and pinMode() functions.
2. **Analog Sensor Reading:** Interface a temperature sensor with Arduino and read analog data using analogRead() function and display temperature values.
3. **Serial Communication:** Use the Serial Monitor to display sensor data and Create a line graph of sensor readings in real-time using Serial communication.
4. **LCD Display:** Connect an 8-bit LCD to Arduino and display fixed and running messages on the LCD using Arduino programming.
5. **Time-Based LED Control:** Use millis() and micros() functions for time-based LED control and create patterns and sequences with LEDs based on time intervals.
6. **Sensor Integration:** Interface a PIR (Passive Infrared) sensor with Arduino and Control an LED or buzzer based on the PIR sensor input.
7. **Relay Switching:** Learn about different types of relays and Connect a relay switch to Arduino and control an electrical appliance (e.g., a lamp) using Arduino.
8. **Humidity and Temperature Monitoring:** Interface humidity and temperature sensors and Display real-time humidity and temperature readings on the Serial Monitor.
9. **Water Detector Alarm:** Use a water sensor to detect water presence and Trigger an alarm or LED when water is detected.
10. **Ultrasonic Distance Measurement:** Interface an ultrasonic sensor with Arduino and Measure and display the distance of an object using the sensor.



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**SKILL BASED MACRO PROJECTS**

**1. Digital Thermometer with Temperature Sensor:**

- Use a temperature sensor to measure ambient temperature.
- Display the temperature readings on an 8-bit LCD connected to Arduino.
- Implement user-friendly features like switching between Celsius and Fahrenheit.

**2. Smart Plant Watering System:**

- Integrate a water detector sensor with Arduino to detect soil moisture.
- Use a relay switch to control a water pump for automated plant watering.
- Implement a system that notifies users when the soil moisture level is low.

**3. PIR Motion-Activated Light:**

- Connect a PIR motion sensor to Arduino.
- Control an LED or a light source using the PIR sensor to create a motion-activated light system.
- Explore ways to adjust sensitivity and duration of the light.

**4. Ultrasonic Distance Measurement:**

- Interface an ultrasonic sensor with Arduino for distance measurement.
- Implement a system that calculates and displays the distance on the LCD.
- Experiment with different objects and distances to test the accuracy.

**5. Serial Communication Data Logger:**

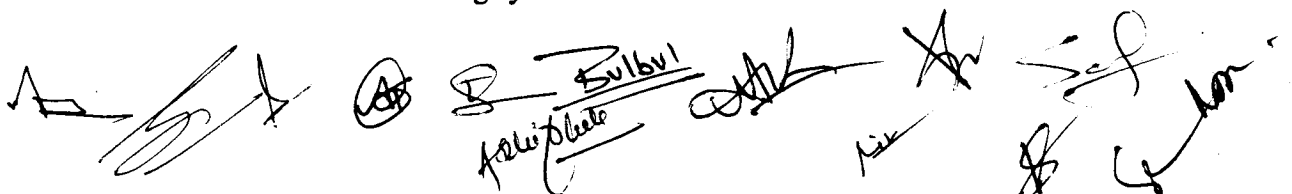
- Utilize the Serial Monitor for communication between Arduino and a computer.
- Log data from a sensor (e.g., temperature or humidity) and display it on the Serial Monitor.
- Explore ways to store data for later analysis.

**6. Interactive Message Display System:**

- Develop a dynamic message display using the LCD library.
- Create a system that allows users to input messages through the Serial Monitor.
- Display the messages on the LCD with scrolling or fixed display options.

**7. Humidity and Temperature Monitoring System:**

- Combine humidity and temperature sensors to create a comprehensive environmental monitoring system.



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- Display real-time humidity and temperature readings on the LCD.
- Implement threshold alerts for abnormal conditions.

**8. Arduino Interrupt-Based Timer:**

- Explore the use of interrupts in Arduino programming.
- Develop a timer using interrupts to trigger specific actions at predetermined intervals.
- Use the timer for controlling external devices or events.

**9. Home Automation System with Relay Switches:**

- Connect and control multiple electrical appliances using electromagnetic relays.
- Create a simple home automation system that allows users to remotely control devices.
- Explore safety features and feedback mechanisms.

**10. Ultrasonic Security System:**

- Integrate ultrasonic sensors to detect intruders or obstacles.
- Use the information from the sensors to trigger alarms or notifications.
- Experiment with the system's sensitivity and response time.

**SKILL BASED MINI PROJECTS**

1. Design intelligent home locking system using a stepper motor (working as a lock) and nodeMCU (as a wireless transmitter and receiver) interfaced to arduino uno. Control the stepper motor/locking mechanism wirelessly using NodeMCU by giving instructions to the lock accordingly.
2. Design Intelligent water level management system using through depth sensor the Arduino UNO alerts the user through call by using GSM module, (NodeMCU). The proposed system evacuates the water to a storage tank through a submersible water pump.
3. Design and development of a RFID based Room Automation using microcontroller. RFID system uses Radiofrequency electromagnetic fields to transfer data from a RFID tag to identify and track the object. This system will apply Radio Frequency technology, which consists of RFID Tags, RF Readers with antennas, Arduino, transmitter- receiver, and added networking properties to identify and track objects.

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4. Design and development of an IoT-based smart home automation system using a microcontroller-based Arduino board and mobile-based Short Message Service (SMS) application working functionality with Wi-Fi connectivity to establish communication between the Arduino module and automated home appliances.
  5. Design and development Intelligent Automatic Irrigation System using an Arduino microcontroller, servo motor to control and sense the thing in the projects such as sense or measure the moisture in the soil we are using soil moisture sensor. The Arduino sends the signals to the relay module and the water pump is turned on for some time and can change the time by modifying the code.
- 

*Asst. Prof.*  
*Bulbul*  
*Mir*  
*Scf*  
*Mr.*

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**ANNEXURE - XI**

***Scheme and Syllabi  
of  
B. Tech II Semester  
(Batch Admitted in 2023-24)  
(Information Technology)  
Under Flexible Curriculum  
[ITEM IT -15]***



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Department of Information Technology

**DATA STRUCTURES**  
**3160221**

L	T	P	Total Credits
3	-	2	4

**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.

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**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.

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**RECOMMENDED BOOKS**

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2<sup>nd</sup> 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. estimate the performance of Algorithms.
  - CO2. explain the working of linear/Non Linear data structures.
  - CO3. apply 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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**PYTHON PROGRAMMING**  
**3160222**

L	T	P	Total Credits
2	1	2	4

**COURSE OBJECTIVES**

- To develop the understanding of algorithms, programming approaches and program documentation techniques in Python.
- To study the concepts of procedural and object oriented programming techniques in Python.
- To design and implement basic programming solutions using Python programming constructs.

**Unit I**

Introduction to Python: Formal and natural languages, Downloading and installing Python. Problem-solving methods and algorithm development. The first program, Variables, expressions, keywords, Operators, Expressions and statements, Interactive mode and script mode, Order of operations. Datatypes: Numeric, string, list tuple, dictionary, set.

**Unit II**

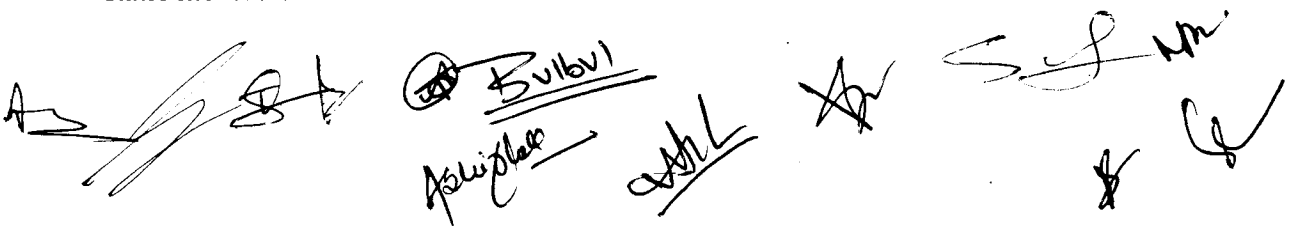
Function, ways of passing arguments to functions, user defined and inbuilt functions, lambda function. Control Statements: Conditional and unconditional branching, while loop, for loop, loop control statements, range function. Numeric, String, list, tuple, dictionary and set manipulation operations using loops and inbuilt manipulation functions. Packages and modules in python.

**Unit III**

Exception and File Handling: Errors vs exceptions, Exceptions handling with try block, handling multiple exceptions, writing your own exceptions, file handling modes, reading, writing and appending a file, Handling file exceptions.

**Unit IV**

Object oriented programming: Characteristics and features of OOPS, Classes and objects, constructors and destructors, defining member variables and functions, visibility modes, static members.

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### Unit V

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, polymorphism in python. Inheritance: Introduction, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Association, Aggregation and composition. Array manipulation and visualization using numpy and matplotlib libraries.

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### RECOMMENDED BOOKS

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

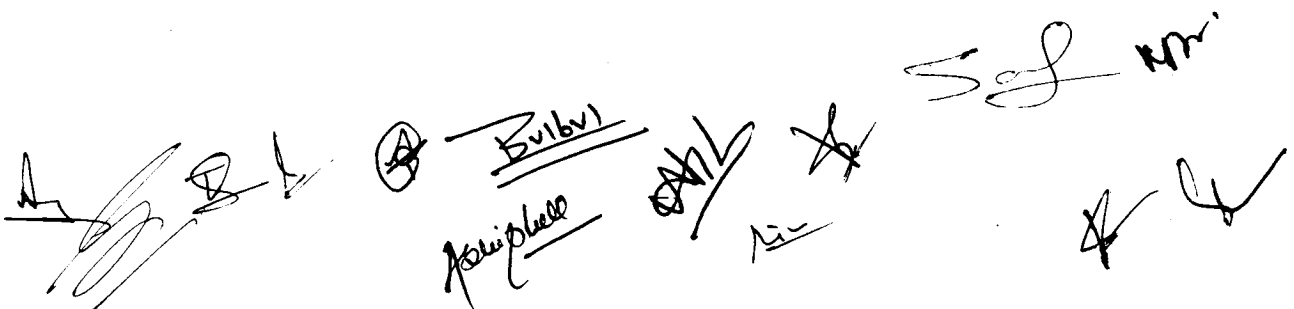
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### COURSE OUTCOMES

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

- CO1. explain basic syntax and building blocks in python programming language.
- CO2. solve computational problem using python programming language
- CO3. hands on experience to online coding tools like colab.
- CO4. design a program utilizing the features of object oriented concept.
- CO5. analyze some of the libraries available for solving problems.
- CO6. apply skill of identifying appropriate python constructs for problem solving.

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Department of Information Technology

**DATABASE MANAGEMENT SYSTEM**  
**3160223**

L	T	P	Total Credits
2	1	2	4

**COURSE OBJECTIVES**

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

---

**Unit-I**

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

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

**Unit-II**

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

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

**Unit-III**

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

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### Unit-IV

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

### Unit-V

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

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### RECOMMENDED BOOKS

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

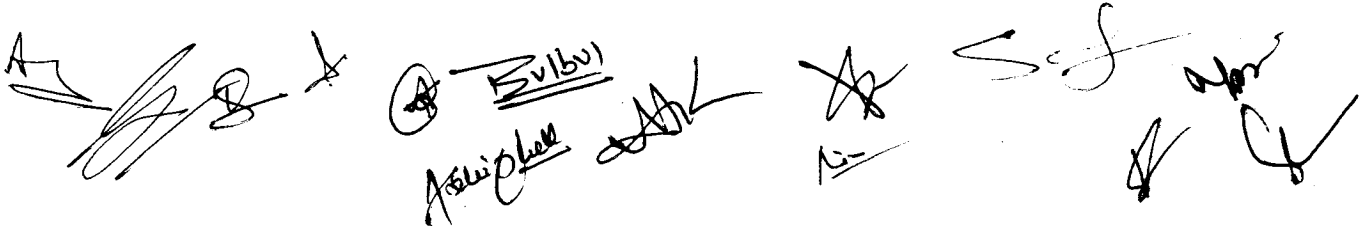
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### COURSE OUTCOMES

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

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

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Department of Information Technology

## COMPUTER SYSTEM ORGANIZATION

3160224

L	T	P	Total Credits
2	1	-	3

### COURSE OBJECTIVE

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

#### Unit -I

**Introduction:** Von Newman Model, Various Subsystems: Input Unit, Output Unit, Memory Unit, CPU, Various types of registers, System Bus, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Micro-Operations: Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations.

#### Unit- II

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

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

#### 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, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA),

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Input-Output Processor (IOP) [REDACTED]  
[REDACTED]

### Unit-V

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

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### 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. explain the basic building blocks of computer architecture.
- CO2. describe computer arithmetic concepts and related algorithms
- CO3. explain various components of CPU organization & 8085 microprocessor.
- CO4. implement assembly language programming.
- CO5. analyze various modes of Input-Output data transfer.
- CO6. illustrate the concept of memory mapping, multiprocessor and pipelining

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***Experiments List / Lab manuals***  
***of***  
***Laboratory Courses***  
***B. Tech II Semester***  
***(Batch Admitted in 2023-24)***  
***(Information Technology)***  
***Under Flexible Curriculum***  
***[ITEM IT -16]***

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Department of Information Technology

**DATA STRUCTURES**  
**3160221**

**LIST OF PROGRAMS**

1. Write a program to implement doubly linked list with all possible deletion operations.
2. Write a program to insert an element in the beginning of the circular linked list.
3. Write a program to implement stack using linked list.
4. Write a program to count the number of nodes in the binary search tree.
5. Write a program to implement AVL Tree.
6. Write a program to traverse the BST in pre-order and post-order.
7. Write a program to implement Graph using an array.
8. Write a program to implement Breadth First Search.
9. Write a program to implement Depth First Search.
10. Write a program to implement Spanning Tree.
11. Write a program to implement binary search algorithm.
12. Write a program to implement Heap Sort.
13. Write a program for implementing the Radix Sort methods to arrange a list of integers in ascending order.
14. Write a program for implementing the Quick Sort methods to arrange a list of integers in ascending order.

---

**COURSE OUTCOMES**

After completion of the course students would be able to:

- CO1. build linear data structure such as stacks, queues, linked lists.
  - CO2. display the representation and traversal techniques of tree and graphs.
  - CO3. identify appropriate data structures to represent data items in real world problems.
  - CO4. construct sorting and searching algorithms using relevant data structures.
  - CO5. create programs using data structures such as heaps.
  - CO6. design new abstract data using linear/non-linear data structures.
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**DATABASE MANAGEMENT SYSTEM**  
**3160223**

**LIST OF PROGRAMS**

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

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

1. Implementation of DDL commands of SQL with suitable examples.
  - a. Create table
  - b. Alter table
  - c. Drop Table
2. Implementation of DML commands of SQL with examples.
  - a. Insert
  - b. Update
  - c. Delete
3. Implementation of different type of function with suitable example
  - a. Number function
  - b. Aggregate function
  - c. Character function
  - d. Conversion function
  - e. Data function
4. Implementation of different type of operators in SQL.
  - a. Arithmetic operators
  - b. Logical operators
  - c. Set operator
  - f. Comparison Operator
  - g. Special operator
5. Implementation of type of joins.
  - a. Inner Join
  - b. Outer Join

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**ANNEXURE - XIII**

***Skill Based Micro, Macro and Mini-Project  
of  
Laboratory Courses  
B. Tech II Semester  
(Batch Admitted in 2023-24)  
(Information Technology)  
Under Flexible Curriculum  
[ITEM IT -17]***

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## DATA STRUCTURES

3160221

### LIST OF PROJECTS

#### SKILL BASED MICRO PROJECTS

1. Write a program to create an array of N Integer Elements.
2. Write a program to implement linear search in an array.
3. Write a program to create Singly Linked List (SLL) of Integer Data.
4. Write a program for implementing the Selection sort methods to arrange a list of integers in ascending order.

#### SKILL BASED MACRO PROJECTS

1. Design, Develop and Implement a menu driven Program for the following Array operations
  - a. Inserting an element at a given valid Position
  - b. Deleting an element at a given valid Position
  - c. Display of array elements
2. Design, Develop and Implement a menu driven Program for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX)
  - a. Push an Element on to Stack
  - b. Pop an Element from Stack
  - c. Demonstrate Overflow and Underflow situations on Stack
  - d. Exit
3. Design, Develop and Implement a menu driven Program for the following operations on doubly linked list:
  - a. Insert at the beginning.
  - b. Insert at specific position.
  - c. Insert at the end.
  - d. Exit.
4. Given an array of elements, construct a complete binary tree from this array in level order fashion. That is, elements from left in the array will be filled in the tree level wise starting from level 0.

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5. Design, Develop and Implement a menu driven Program for the following operations on Binary Search Tree (BST) of Integers
  - a. Create a BST of N Integers.
  - b. Traverse the BST in In-order.

### SKILL BASED MINI PROJECTS

1. Write a program to evaluate any arithmetic expressions using STACK.
2. Write a program to implement priority queue for airport check in process.
3. Write a program to implement Music Player using Linked List.
4. Write a program to implement Online Voting System using a graph and linked list.
5. Write a program to design a Snakes game.
6. Design, Develop and Implement a menu driven Program for the following operations on Doubly Linked List (DLL) of Professor Data with the fields: ID, Name, Branch, Area of specialization
  - a. Create a DLL stack of N Professor's Data.
  - b. Create a DLL queue of N Professor's Data Display the status of DLL and count the number of nodes in it.

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## PYTHON PROGRAMMING

3160222

### LIST OF PROJECTS

#### SKILL BASED MICRO PROJECTS

1. Write a python program that validates an email ID entered by the user, where the validation rules include that at least one character should be in lowercase and one in uppercase and contains at least one numeric character and one special symbol.
2. Implement countdown clock and timer in python.
3. Suppose a text file contains information about students in the form of Name, Enrolment, Semester, CGPA. Write a python script to display semester-wise student details in descending order of CGPA.

#### SKILL BASED MACRO PROJECTS

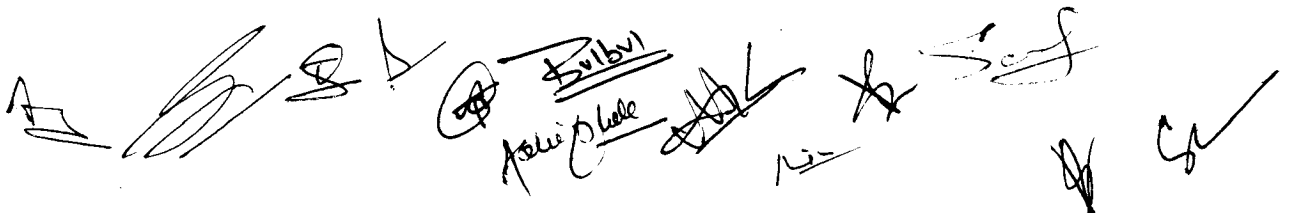
1. Suppose a text file contains information about students in the form of Name, 10th-class exam roll number, marks in physics, marks in chemistry and marks in mathematics. Write a python script to generate a text file containing subject-wise merit list.
2. Design and implementation of a real-time, User friendly Currency Converter.
3. Write a python program to create a Tic-Tac-Toe Game.

#### SKILL BASED MINI PROJECTS

1. Create a login module with below mentioned features:
  - a. Verify username and password correctly
  - b. Register new user and set its password
  - c. Change password of any registered user

Note: Store the usernames and passwords in a Dictionary.

2. Suppose a text file contains employee details in the form of comma separated values as: employee name, ID, gross salary, Annual Provident Fund deposited, Advance tax deposited. Write a python script to calculate annual tax detection for each employee and store details in:
  - a. Dictionary, where key represents employee ID, value represents the net tax to be deposited by the employee.

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b. In a text file as: Name: <Employee Name>; ID: <Employee ID>; Tax: <Tax to be deposited>

Tax to be calculated according to below mentioned rules:

- i. St. deduction: 5 Lac.
  - ii. 0 to 5 Lac: 5% tax deduction
  - iii. 5 to 7.5 Lac: 10% tax deduction
  - iv. 7.5 to 10 Lac: 15% tax deduction
  - v. Above 10 Lac: 20 % tax deduction
3. Write a program in python to represent a student using OOPS where each student is represented by name, ID, Semester and CGPA. The student class to be implemented should contain all the necessary functions appropriate according to a student. The class should contain 3 dictionary variables as static members which should contain a semester-wise topper list. The key in each dictionary should represent the student Merit position, and value should represent details of a particular student.
- 

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## DATABASE MANAGEMENT SYSTEM

3160223

### LIST OF PROJECTS

#### SKILL BASED MICRO PROJECTS

1. Implementation of DDL commands of SQL with below examples.
  - a. Create table
  - b. Alter table
  - c. Drop Table
2. Implementation of DML commands of SQL with examples.
  - a. Insert
  - b. Update
  - c. Delete
3. Implementation of different type of function with below example
  - a. Number function
  - b. Aggregate function
  - c. Character function
  - d. Conversion function
  - e. Data function
4. Implementation of different type of operators in SQL.
  - a. Arithmetic operators
  - b. Logical operators
  - c. Set operator
  - d. Comparison Operator
  - e. Special operator

Some sample SQL queries that you can use with the provided MITS database schema:

Example MITS Database:

Department (Did, Dname)

Faculty (Fid, FName, Did)

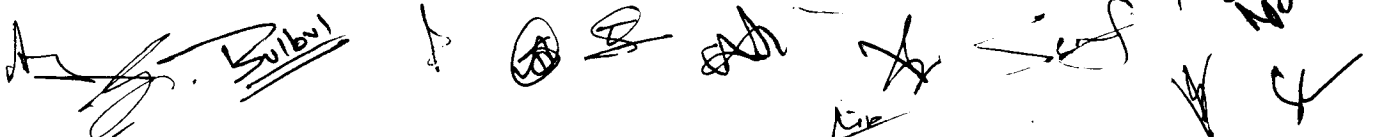
Student (Sid, Sname, Did)

Course (Cid, Cname, Did)

Exam (Exid, Exname, Exdate, Cid)

Enrollment (Enrollid, Sid, Cid)

1. Retrieve all departments.
2. Insert a new department "IT futuristic".
3. Update the name of a specific student member.
4. Retrieve all exams for a specific course.
5. Delete an enrollment record for a student in a specific course.
6. Find the Total number of students in the department of IT.



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### SKILL BASED MACRO PROJECTS

1. Implementation of type of joins.
  - a. Inner Join
  - b. Outer Join
  - c. Natural Join etc.
2. Study and implementation of
  - a. Group by & having clause
  - b. Order By clause
  - c. Indexing
3. Study of Implementation of
  - a. Sub queries
  - b. Views

Some sample SQL queries that you can use with the provided MITS database schema:

Example MITS Database:

Department (Did, Dname)

Faculty (Fid, FName, Did)

Student (Sid, Sname, Did)

Course (Cid, Cname, Did)

Exam (Exid, Exname, Exdate, Cid)

Enrollment (Enrollid, Sid, Cid)

1. Retrieve all faculty members with their respective departments.
2. Retrieve all students along with their respective departments.
3. Retrieve all enrolled students in a specific course.
4. Retrieve all courses taught by a specific faculty member.
5. Retrieve all students who are enrolled in DBMS Course.
6. Retrieve all exams for courses in a specific department.
7. Retrieve all faculty members who teach courses with more than 50 enrolled students.

### SKILL BASED MINI PROJECTS

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

#### Mini Skill Project 1

Consider the following schema for a Library Database:

BOOK (Book\_id, Title, Publisher\_Name, Pub\_Year)



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BOOK\_AUTHORS (Book\_id, Author\_Name)

PUBLISHER (Name, Address, Phone)

BOOK\_COPIES (Book\_id, Programme\_id, No-of\_Copies)

BOOK\_LENDING (Book\_id, Programme\_id, Card\_No, Date\_Out, Due\_Date)

LIBRARY\_PROGRAMME (Programme\_id, Programme\_Name, Address)

### Write SQL queries to

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2022 to Jun 2023.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

### Mini Skill Project 2

Consider the following schema for Order Database:

SALESMAN (Salesman\_id, Name, City, Commission)

CUSTOMER (Customer\_id, Cust\_Name, City, Grade, Salesman\_id)

ORDERS (Ord\_No, Purchase\_Amt, Ord\_Date, Customer\_id, Salesman\_id)

### Write SQL queries to

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

### Mini Skill Project 3

Consider the schema for Movie Database:

ACTOR (Act\_id, Act\_Name, Act\_Gender)

DIRECTOR (Dir\_id, Dir\_Name, Dir\_Phone)

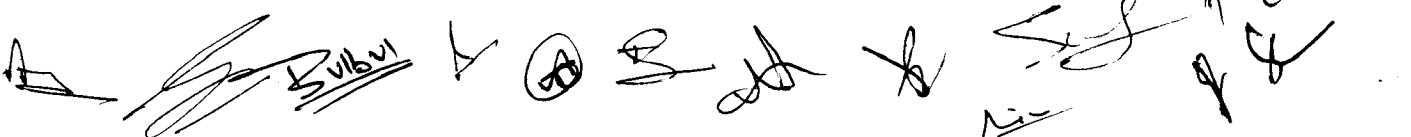
MOVIES (Mov\_id, Mov\_Title, Mov\_Year, Mov\_Lang, Dir\_id)

MOVIE\_CAST (Act\_id, Mov\_id, Role)

RATING (Mov\_id, Rev\_Stars)

### Write SQL queries to

1. List the titles of all movies directed by 'Hitchcock'.

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

### Mini Skill Project 4

Consider the schema for College Database:

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

SEMSEC (SSID, Sem, Sec)

CLASS (USN, SSID)

COURSE (Subcode, Title, Sem, Credits)

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

### Write SQL queries to

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

### Mini Skill Project 5

Consider the schema for Company Database:

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

DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)

DLOCATION (DNo, DLoc)

PROJECT (PNo, PName, PLocation, DNo)

WORKS\_ON (SSN, PNo, Hours)

### Write SQL queries to

1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.

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3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

### Mini Skill Project 6

Imagine you are tasked with designing an Entity-Relationship (ER) model for the database of MITS (a fictional educational institute) to efficiently manage information about departments, faculty, students, courses, exams, enrollments, and faculty teaching assignments. Outline the key entities, their attributes, and the relationships between them in your ER model. Additionally, discuss any assumptions or considerations you took into account during the design process. Explain the cardinality and participation constraints where relevant. Lastly, describe how your ER model supports the representation of the complex relationships within the educational context of MITS.

### Mini Skill Project 7

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

### Mini Skill Project 8

Design an Entity-Relationship (ER) model for a hospital information system that effectively captures the key entities, their attributes, and the relationships between them. Consider entities such as patients, doctors, nurses, medical records, departments, and appointments. Associate with each patient a log of the various tests and examinations conducted. Outline the characteristics of each entity, including primary keys, and describe the relationships between entities. Address any assumptions or considerations you made during the design process, and explain how your ER model accommodates the complex interactions within a hospital setting. Discuss the cardinality and participation constraints where applicable, and highlight the importance of your design in supporting the efficient management of hospital data.

### Mini Skill Project 9

Develop an Entity-Relationship (ER) model for the database of an IPL (Indian Premier League) cricket team. Consider the key entities involved in the context of an IPL team, such as players, teams, matches, coaches, and owners. Outline the attributes of each entity, including primary keys, and establish the relationships between entities. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Take into account any assumptions or considerations that

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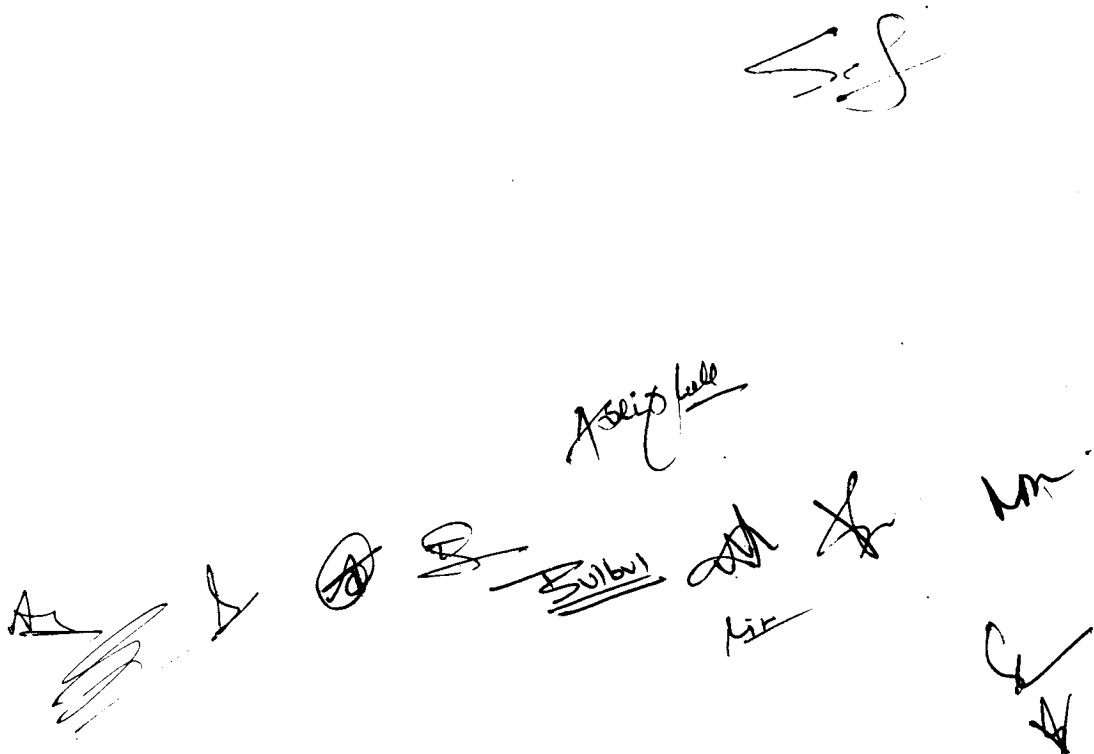
## Department of Information Technology

influenced your design decisions. Describe the cardinality and participation constraints where relevant, and explain how your ER model reflects the intricacies of managing a cricket team within the framework of the IPL. Elaborate on how the relationships between entities contribute to the effective representation of information in the context of an IPL team database.

### Mini Skill Project 10

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

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



***Gaps in CO Attainment Levels***  
***for***  
***January - June 2023 Semester***  
***and***  
***Proposed Corrective Measures for***  
***Improvement***  
***(Information Technology)***  
***[ITEM IT-18]***

**Madhav Institute of Technology and Science, Gwalior**

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**Department of Information Technology**

CO Attainment of B.Tech. Information Technology

Session: Jan 2023-June 2023

Semester	Course Name	Course Outcomes	Direct Attainment %	Level of Direct Attainment	Indirect Attainment %	Level of Indirect Attainment	Overall level of Attainment	Target of level	Gap	Attained/Not Attained	Action Taken
SEMESTER II	2160221 Data Structures	CO1 Outline the basics of Algorithms and their performance criteria.	58.93	2	86.25	3	1.4	2.5	1.1		More problem solving question related to algorithm & their performance will be included in class room discussion.
		CO2 Explain the working of linear/Non Linear data structures.	62	2	79.25	3	2.2	2.5	0.3		Complex programming activities will include for better understanding the concepts of linear or non-linear data structure.
		CO3 Identify the appropriate data structure to solve specific problems.	61.6	2	69	3	2.2	2.5	0.3		Beyond the syllabus, some practical problem will provide to students during class session and discuss important facts related to problem.
		CO4 Analyze the performance of various Data Structures & their applications.	54.13	1	84.75	3	1.4	2.5	1.1		Discuss more programming solutions to student for improving problems solving skills.
		CO5 Evaluate the time/space complexities of various data structures & their applications.	57.2	1	78	3	1.4	2.5	1.1		Discuss more practical examples in class room session and real world problems will discuss.
		CO6 Design the optimal algorithmic solutions for various problems.	59.6	1	84.25	3	1.4	2.5	1.1		More complex real world programming problem will include in examination paper. Also research oriented programming problem will discuss with fast
	2160221 Data Structures LAB	CO1 Outline the basics of Algorithms and their performance criteria.	96	3	73.08	3	3	3	0		Students are motivated to develop mini-projects focusing on real world problems.
		CO2 Explain the working of linear/Non Linear data structures.	78.67	3	76.92	3	3	3	0		Level of target should be improved.
		CO3 Identify the appropriate data structure to solve specific problems.	80	3	74.36	3	3	3	0		More HOT questions should be added
		CO4 Analyze the performance of various Data Structures & their applications.	85.33	3	78.21	3	3	3	0		Students are encouraged to observe, to gain insight into possible approaches/solutions/algorithms to real life problems.
		CO5 Evaluate the time/space complexities of various data structures & their applications.	94.67	3	75.64	3	3	3	0		Level of target should be increased
		CO6 Design the optimal algorithmic solutions for various problems.	81.33	3	76.92	3	3	3	0		Discuss extra Tutorial- sheets
	2160222 Python Programming	CO1 Define basics syntax and features of python programming language	68.21	2	90.25	3	3	2.5	-0.5		Additional topic specific tests should be conducted
		CO2 Solve computational problem using python language.	61.92	2	84.5	3	3	2.5	-0.5		Target level should be improved
		CO3 Take part in online coding platforms.	61.79	2	72.5	3	2.9	2.5	-0.4		Students are motivated to develop mini-projects focusing on real world problems.
		CO4 Inspect the python program for errors.	69.36	2	88	3	3	2.5	-0.5		Design of more converter should be initiated to make the work of students as par
		CO5 Design a program using the features of object oriented concept.	60.64	2	82.5	3	3	2.5	-0.5		Level of target should be increased
		CO6 Construct the python code for real world problem using the libraries.	70.77	2	86.5	3	3	2.5	-0.5		More HOT questions should be added
	2160222 Python Programming LAB	CO1 Apply basic programming concepts.	91.03	3	90.58	3	3	3	0		Level of questions should be improved.
		CO2 Develop algorithms and flowchart for a given problem.	97.44	3	85.93	3	3	3	0		Level of questions in examination will improve and also discuss based research problems with students.
		CO3 Illustrate the concepts of procedural programming.	98.72	3	83.7	3	3	3	0		Discuss extra Tutorial- sheets
		CO4 Implement the concepts of object oriented programming.	97.44	3	85.51	3	3	3	0		Project based learning should be included in the subject
		CO5 Design suitable programming solutions using procedural/object oriented programming paradigms.	97.44	3	88.15	3	3	3	0		More practical based problems should be included in the curriculum
		CO6 Develop computer programs to solve real world problems.	97.44	3	84.44	3	3	3	0		Level of target should be improved.
2160223 Database Management System	CO1 Demonstrate the concepts of different types of database system.	74.13	2	95.75	3	3	2.5	-0.5		Level of questions should be improved.	
	CO2 Apply relational algebra concepts to design database system.	64.13	2	84.25	3	2.5	2	-0.5		More projects on solving complex problems will be included.	
	CO3 Make use of queries to design and access database system.	60.93	2	75.25	3	3	2.5	-0.5		Survey oriented case studies should be provided to students to identify the impact of pollution on ecosystem.	
	CO4 Analyze the evaluation of transaction processing and concurrency control	70.13	2	89.5	3	3	2.5	-0.5		More HOT questions should be added	
	CO5 Determine the normal form of the relation.	69.47	2	84.25	3	3	2.5	-0.5		Discussed extra Tutorial- sheets	

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SEMESTER IV

2160223 Database Management System LAB	CO6	Design a ER diagram/database system for a real world application.	74.8	3	88	3	3	2.5	-0.5	Level of questions should be improved.
	CO1	Construct database schema for a given problem domain.	93.33	3	90.58	3	3	2.5	-0.5	Level of target should be improved.
	CO2	Apply integrity constraints on a database scheme using a state-of-the-art RDBMS.	98.67	3	85.93	3	2.5	2	-0.5	More practical approach and problems would be introduced with students.
	CO3	Apply SQL queries using DDL and DML to design and access database systems.	100	3	83.7	2.2	3	2.5	-0.5	More projects on software development would be included.
	CO4	Make use of operators and functions used in query.	98.67	3	85.51	2.9	3	2.5	-0.5	Real life Projects can be assigned to improve the software development.
	CO5	Distinguish tables and views for database systems.	98.67	3	88.15	2.2	3	2.5	-0.5	Level of target should be improved.
2160224 Computer System Organization	CO6	Develop a small project for a real world scenario.	98.67	3	84.44	3	3	2.5	-0.5	Survey oriented case studies should be provided to students to identify the impact of pollution on ecosystem.
	CO1	Recall the basic building blocks of computer Architecture.	91.47	3	92	3	3	2.5	-0.5	More HOT questions should be added
	CO2	Compare different memories.	81.33	3	85.75	3	3	2.5	-0.5	Discussed extra Tutorial- sheets
	CO3	Apply the concept of memory mapping, multiprocessor and pipelining in solving real world problems.	82.4	3	80	3	3	2.5	-0.5	More HOT questions should be added
	CO4	Analyze various modes of Input-Output data transfer.	64.67	2.3	90	3	3	2.5	-0.5	Level of questions in examination will improve and also discuss based research problems with students.
	CO5	Evaluate the arithmetic related to the number system.	70.93	3	86.75	3	3	2.5	-0.5	More assignments and tutorials are to be given to students for better understanding.
160411 Computer Graphics & Multimedia	CO6	Develop the skill of writing low level programming.	66.13	2.4	87.75	3	3	2.5	-0.5	More HOT questions should be added
	CO1	Explore various display devices and applications of computer graphics.	76.25	3	80.25	3	3	2.5	-0.5	Level of questions should be improved.
	CO2	Illustrate various scan conversion techniques like line, circle, curve and shape drawing algorithms.	70.14	3	78.75	3	3	2.5	-0.5	Higher order thinking question should be included. Also encourage to find some research problem related to technological and economic development.
	CO3	Apply 2-dimensional, 3-dimensional transformations and projections on images.	68.06	2.3	78.25	3	2.8	2.5	-0.3	Project based learning should be included in the subject
	CO4	Classify methods of image clipping and various algorithms for line and polygon clipping.	76.11	3	79.75	3	3	2.5	-0.5	More HOT questions should be added
	CO5	Apply appropriate filling algorithms. hidden surface elimination algorithm on images.	60.42	3	78.75	2.2	2.5	0.3	Enhance learning through additional questions, extra resources, and interactive sessions to help attain the course outcome on filling and hidden surface	
160411 Computer Graphics & Multimedia LAB	CO6	Summarize various color models, shading methods and multimedia system.	64.17	3	80	3	2.5	2.5	0	Students are motivated to develop mini-projects focusing on real world problems.
	CO1	Understand the basic concepts of computer graphics.	100	3	89.29	3	3	2.5	-0.5	Survey oriented case studies should be provided to students to identify the impact of pollution on ecosystem.
	CO2	Demonstrate scan conversion problems using programming language.	100	3	88.29	3	3	2.5	-0.5	More tough quiz and assignment should be given to access the student
	CO3	Implement the concepts of geometric transformation of 2D and 3D objects.	100	3	89.81	3	3	2.5	-0.5	Target level should be improved
	CO4	Apply clipping and filling techniques for modifying an object.	100	3	92.98	3	3	2.5	-0.5	More HOT questions should be added
	CO5	Understand the practical implementation of modelling and rendering.	100	3	87.1	3	3	2.5	-0.5	Discussed extra Tutorial- sheets
160413 Computer Networks	CO6	Demonstrate the concept of viewing of 2D objects.	100	3	87.6	3	3	2.5	-0.5	Level of questions should be improved.
	CO1	Explain the fundamental concepts of computer network.	68.19	2.3	94	3	2.9	2.5	-0.4	Project based learning should be included in the subject
	CO2	Illustrate the basic taxonomy & terminologies of computer network.	61.11	2.1	84.25	3	2.3	2	-0.3	Students should be made to solve more complex problems.
	CO3	Identify various parameter for affecting the performance of computer network.	70.83	3	71.75	3	3	2.5	-0.5	More practical based topics should be included in the curriculum
	CO4	Analyze the concepts of communication using various layer of OSI model.	61.67	2.1	88.25	3	2.3	2.5	0.2	Discuss more practical examples in class room session and real world problems will discuss.
	CO5	Evaluate the performance of computer network in congestion and Internet.	69.31	2.5	79.75	3	2.9	2.5	-0.4	Target level should be improved
160611 Compiler Design	CO6	Design the network environment and applications for implementation of computer networking concept.	71.94	3	88	3	3	2.5	-0.5	Target level should be improved
	CO1	Define the concepts of finite automata and context free grammar.	54.72	3	95.75	3	3	3	0	Survey oriented case studies should be provided to students to identify the impact of pollution on ecosystem.
	CO2	Build the concept of working of compiler.	56.53	3	86.75	3	3	3	0	Project based learning should be included in the subject
	CO3	Examine various parsing techniques and their comparison.	60	3	81	3	3	3	0	More tough quiz and assignment should be given to access the student
	CO4	Compare various code generation and code optimization techniques.	61.94	3	91.75	3	3	3	0	More practical based problems should be included in the curriculum

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SEMESTER VI

160611 Compiler Design LAB	CO5	Analyze different tools and techniques for designing a compiler.	55.97	3	88	3	3	3	0	Project based learning should be included in the subject
	CO6	Design various phases of compiler.	55.97	3	93.75	3	3	3	0	Target level should be improved
	CO1	Discuss the knowledge of patterns, tokens & regular expressions in programming for problem solving.	98.61	3	96.3	3	3	3	0	More HOT questions should be added
	CO2	Design and Implement various parsing techniques.	98.61	3	96.3	3	3	3	0	Target level should be improved
	CO3	Operate different types of compiler tools.	98.61	3	100	3	3	3	0	Additional topic specific tests should be conducted
	CO4	Develop programs for implementing code optimization techniques	98.61	3	96.3	3	3	3	0	Lab experiment list of the subject should be revised
160612 Data Mining	CO5	Build symbol table and intermediate codes.	98.61	3	100	3	3	3	0	Project based learning should be included in the subject
	CO6	Demonstrate the functionalities of different phases of the compilation process.	98.61	3	100	3	3	3	0	More tough quiz and assignment should be given to access the student
	CO1	Explain various basic concept of data mining and data warehousing.	90.8	3	85	3	3	2.5	-0.5	More practical based problems should be included in the curriculum
	CO2	Classify various database systems and data models / schemas of data warehouse.	88.93	3	77.5	3	3	2.5	-0.5	Complex problem activities will include for better understanding the concepts of data models / schemas of data warehouse.
	CO3	Compare various methods for storing & retrieving data from different data sources/repository.	60	2	69.5	2	2.2	2.5	0.3	Beyond the syllabus, some practical problem will provide to students during class session.
	CO4	Apply data mining techniques for knowledge extraction from large amount of data .	70.67	3	82	3	3	2.5	-0.5	Discuss more recurrence knowledge extraction to student for improving problems solving skills.
160612 Data Mining LAB	CO5	Analyze data for knowledge discovery & prediction using appropriate algorithms.	63.2	2.22	74.75	3	2.5	2.5	0	Discuss more practical examples in class room session and prediction problems will discuss.
	CO6	Develop real world application using data mining techniques.	71.2	3	80	3	3	2.5	-0.5	More complex real world problem will include in examination paper. Also research oriented problem will discuss with fast learners.
	CO1	Write, test, and debug simple Data mining models	100	3	74.44	3	3	3	0	Survey oriented case studies should be provided to students to identify the impact of pollution on ecosystem.
	CO2	Solve computational problem using Weaka tool.	100	3	72.78	3	3	3	0	More HOT questions should be added
	CO3	Familiar with basics syntax and features of weaka language.	100	3	77.22	3	3	3	0	Discussed extra Tutorial- sheets
	CO4	Use Weaka lists, tuples, dictionaries for representing compound data.	100	3	73.33	3	3	3	0	Level of questions should be improved.
160613 Artificial Intelligence and Machine Learning	CO5	Design a program utilizing the features of Clustering Algorithms.	100	3	73.89	3	3	3	0	Additional topic specific tests should be conducted
	CO6	Utilize some of the libraries available for solving problems.	100	3	70	3	3	3	0	More HOT questions should be added
	CO1	Define basic concepts of Artificial Intelligence & Machine Learning.	92.64	3	91.25	3	3	2.5	-0.5	Level of questions should be improved.
	CO2	Illustrate various techniques for search and processing	81.94	3	82	3	3	2	-1	Students are encouraged to participate in various coding competitions which involves the design and development of AIML based software.
	CO3	Identify various types of machine learning problems and techniques	73.06	3	72.25	3	3	2.5	-0.5	Discuss extra Tutorial- sheets
	CO4	Analysis various techniques in Artificial Intelligence, ANN & Machine Learning	67.08	2.71	88.25	3	2.71	2.5	-0.21	Real life Projects can be assigned to improve the software development.
160613 Artificial Intelligence and Machine Learning LAB	CO5	Apply AI and ML techniques to solve real world problems	83.33	3	81	3	3	2.5	-0.5	Students are encouraged to observe, to gain insight into possible approaches/solutions/algorithms to real life problems.
	CO6	Build AI enabled intelligent systems for solving real world problems	74.17	3	84.25	3	3	2.5	-0.5	Discussed extra Tutorial- sheets
	CO1	Illustrate the concepts of Python programming language	98.61	3	89.47	3	3	2.5	-0.5	Level of questions should be improved.
	CO2	Implement various techniques for knowledge representation and processing	98.61	3	80.7	3	3	2	-1	Research oriented mini skill projects are encouraged to develop and hone their research skills.
	CO3	Explore different AI and ML tools in Python	98.61	3	78.95	3	3	2.5	-0.5	Higher order thinking question should be included. Also encourage to find some research problem related to technological and economic development.
	CO4	Analysis various Artificial Intelligence & Machine Learning techniques over various performance parameters	98.61	3	82.46	3	3	2.5	-0.5	Level of questions should be improved.
160613 Artificial Intelligence and Machine Learning LAB	CO5	Apply AI and ML techniques to solve real world problems	98.61	3	78.95	3	3	2.5	-0.5	More projects on solving complex problems will be included.
	CO6	Build AI enabled intelligent systems for solving real world problems	98.61	3	77.19	3	3	2.5	-0.5	Survey oriented case studies should be provided to students to identify the impact of pollution on ecosystem.

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**ANNEXURE - XV**

***PO Attainment, CO-PO Mapping  
and Gap Analysis  
for  
Batch 2019-2020  
(Information Technology)  
[ITEM IT-19]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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## Department of Information Technology

### Vision

“To create world class quality Engineers and Technocrats capable of providing leadership in all spheres of life and society”

### Mission

To provide quality education

To organize and arrange innovative courses / training programs /Workshops in the field of Computer Science & Engineering and Information Technology

To Promote research in the fields of Computer Science & Engineering and Information Technology

## Programme Educational Objectives

PEO1	Work productively as Information Technology professional including supportive and leadership roles on multidisciplinary teams.
PEO2	Communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavors with high regard to legal and ethical responsibilities.
PEO3	Engage in life-long learning to remain current in their profession and be ready to undertake challenging problems.
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

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**Session: Jan- June 2023**

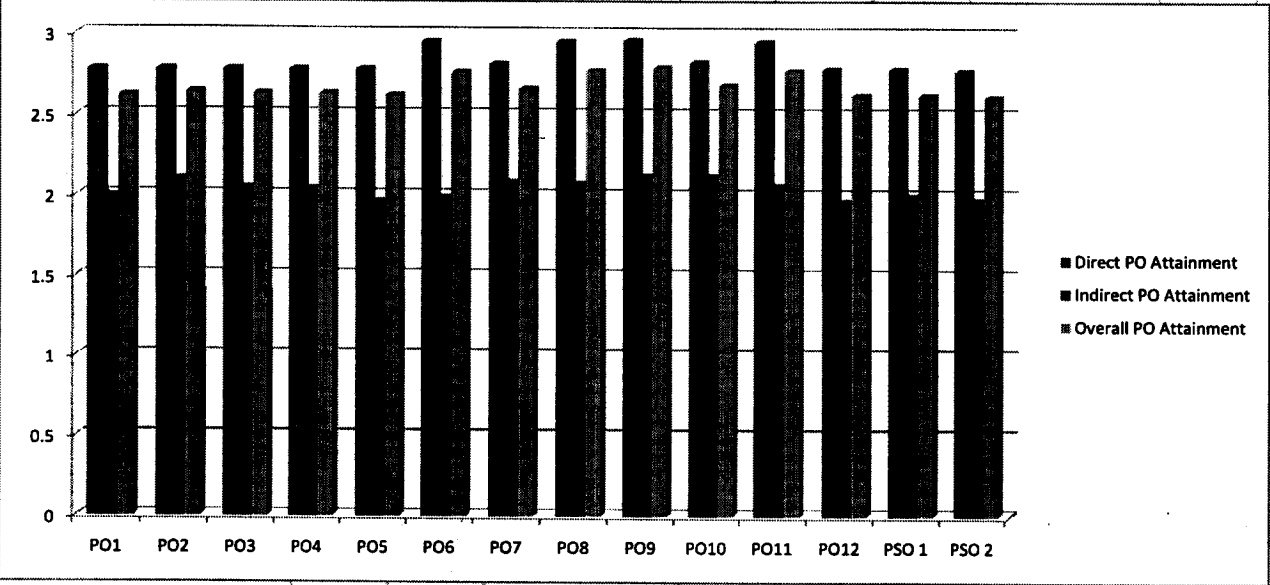
1	Data Structures (2160221)	1.64	1.73	1.73	1.67	1.64		1.4			1.8		1.8	1.58	1.76
2	Data Structures LAB (2160221)	3	3	3	3	3		3			3		3	3	3
3	Python Programming (2160222)	2.98	2.98	2.98	2.99	2.98		3			2.95		2.95	2.98	2.98
4	Python Programming LAB (2160222)	3	3	3	3	3		3			3		3	3	3
5	Data Base Management System (2160223)	3	2.83	3	2.92	3	3	3	3	3	3	3	2.92	2.9	
6	Data Base Management System LAB (2160223)	3	2.83	3	2.92	3	3	3	3	3	3	3	2.92	2.9	
7	Computer System Organization (2160224)	2.76	2.87	2.77	2.89	2.71	2.8	2.8	2.8					2.89	2.77
8	Computer Graphics and Multimedia (160411)	3	3	3	3	3	3	3	3	3	3	3	3	3	3
9	Computer Graphics and Multimedia LAB (160411)	3	3	3	3	3	3	3	3	3	3	3	3	3	3
10	Computer Networks (160413)	2.77	2.73	2.73	2.73	2.73	2.82	2.82	2.82	2.82	2.73	2.73	2.73	2.67	
11	Compiler Design (160611)	1.64	1.67	1.67	1.6	1.72		2.2			2.2		1.8	1.71	1.69
12	Compiler Design LAB (160611)	3	3	3	3	3		3			3		3	3	3
13	Data Mining (160612)	2.74	2.83	2.72	2.85	2.74		3			2.6		2.6	2.8	2.81
14	Data Mining LAB (160612)	3	3	3	3	3		3			3		3	3	3
15	Artificial Intelligence and Machine Learning (160613)	3	2.95	2.95	2.97	2.96	2.95			2.9	3	2.95	2.95	2.97	2.96
16	Artificial Intelligence and Machine Learning LAB (160613)	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	<b>Direct PO Attainment</b>	<b>2.78</b>	<b>2.78</b>	<b>2.78</b>	<b>2.78</b>	<b>2.78</b>	<b>2.95</b>	<b>2.81</b>	<b>2.95</b>	<b>2.96</b>	<b>2.82</b>	<b>2.95</b>	<b>2.78</b>	<b>2.78</b>	<b>2.77</b>

INDIRECT PO ATTAINMENT		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
Survey 1	(Exit Survey)	2.06	2.26	2.19	2.23	2.26	2.23	2.32	2.19	2.39	2.26	2.23	2.35	2.19	2.23
Survey 2	(Alumni Survey)	2.1	2.1	2.06	2.14	2.01	2.08	2.06	2.12	2.14	2.19	2.26	2.23	2.15	2.1
Survey 3	(Employer Survey)	1.84	1.93	1.9	1.74	1.61	1.66	1.87	1.89	1.82	1.9	1.68	1.31	1.66	1.58
	<b>Indirect PO Attainment</b>	<b>2</b>	<b>2.1</b>	<b>2.05</b>	<b>2.04</b>	<b>1.96</b>	<b>1.99</b>	<b>2.08</b>	<b>2.07</b>	<b>2.12</b>	<b>2.12</b>	<b>2.06</b>	<b>1.96</b>	<b>2</b>	<b>1.97</b>

PO ATTAINMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
<b>Direct PO Attainment</b>	<b>2.78</b>	<b>2.78</b>	<b>2.78</b>	<b>2.78</b>	<b>2.78</b>	<b>2.95</b>	<b>2.81</b>	<b>2.95</b>	<b>2.96</b>	<b>2.82</b>	<b>2.95</b>	<b>2.78</b>	<b>2.78</b>	<b>2.77</b>
<b>Indirect PO Attainment</b>	<b>2</b>	<b>2.1</b>	<b>2.05</b>	<b>2.04</b>	<b>1.96</b>	<b>1.99</b>	<b>2.08</b>	<b>2.07</b>	<b>2.12</b>	<b>2.12</b>	<b>2.06</b>	<b>1.96</b>	<b>2</b>	<b>1.97</b>
<b>Overall PO Attainment</b>	<b>2.62</b>	<b>2.64</b>	<b>2.63</b>	<b>2.63</b>	<b>2.62</b>	<b>2.76</b>	<b>2.66</b>	<b>2.77</b>	<b>2.79</b>	<b>2.68</b>	<b>2.77</b>	<b>2.62</b>	<b>2.62</b>	<b>2.61</b>

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 Apurva [Signature]

Direct PO1 Attainment	Average of PO1s of all courses
Direct PO2 Attainment	Average of PO2s of all courses
Overall PO Attainment	Average of respective direct and indirect POs



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**Batch 2019-2023 Exit Survey**

Response number	PO1. Engineering knowledge:	PO2. Problem analysis:	PO3. Design/development of solutions:	PO4. Conduct investigations of complex problems:	PO5. Modern tool usage:	PO6. The engineer and society:	PO7. Environment and sustainability:	PO8. Ethics:	PO9. Individual and teamwork:	PO10. Communication:	PO11. Project management and finance:	PO12. Life-long learning:	PO1. Students are able to exhibit analytical & logical skills and apply knowledge of Information Technology.	PO2. Students are able to identify, formulate and resolve real-life/social problems by using current development in the field of information technology.
1	Adequate	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	Good
2	Substanti	4/Very Gd	4/Very Good	4/Very Good	4/Very Gd	4/Very Good	4/Very Good	4/Very G	4/Very Go	4/Very Gd	4/Very Gd	4/Very G	4/Very Good	Excellent
3	Low (Slight)	2/Average	2/Average	2/Average	2/Average	2/Average	2/Average	2/Average	3/Good	2/Average	1/Below A	2/Average	2/Average	Below Average
4	Moderate	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	Good
5	Highly Suf	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	Excellent
6	Adequate	2/Average	2/Average	2/Average	2/Average	3/Good	3/Good	2/Average	3/Good	4/Very Gd	2/Average	3/Good	2/Average	Good
7	Adequate	4/Very Gd	4/Very Good	4/Very Good	4/Very Go	4/Very Good	4/Very Good	4/Very G	4/Very Go	4/Very Gd	4/Very Gd	4/Very G	4/Very Good	Very Good
8	Highly Suf	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	Excellent
9	Substanti	5/Excellent	4/Very Good	4/Very Good	4/Very Go	4/Very Good	4/Very Good	4/Very G	5/Excellent	3/Good	3/Good	5/Excell	4/Very Good	Good
10	Adequate	2/Average	2/Average	2/Average	2/Average	3/Good	3/Good	2/Average	3/Good	4/Very Gd	3/Good	3/Good	2/Average	Very Good
11	Substanti	4/Very Gd	5/Excellent	4/Very Good	4/Very Go	4/Very Good	4/Very Good	4/Very G	4/Very Go	4/Very Gd	4/Very Gd	4/Very G	4/Very Good	Very Good
12	Substanti	4/Very Gd	4/Very Good	4/Very Good	4/Very Go	4/Very Good	4/Very Good	4/Very G	4/Very Go	4/Very Gd	4/Very Gd	4/Very G	4/Very Good	Very Good
13	Substanti	3/Good	3/Good	3/Good	4/Very Gd	4/Very Good	4/Very Good	5/Excell	4/Very Go	5/Excellent	4/Very Gd	5/Excell	4/Very Good	Very Good
14	Moderate	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	Good
15	Substanti	3/Good	3/Good	4/Very Good	4/Very Go	4/Very Good	4/Very Good	4/Very G	5/Excellent	5/Excellent	4/Very Gd	4/Very G	4/Very Good	Good
16	Moderate	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	Average
17	Highly Suf	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	Excellent
18	Low (Slight)	4/Very Gd	4/Very Good	3/Good	1/Below A	2/Average	1/Below Ave	1/Below	2/Average	2/Average	2/Average	4/Very G	3/Good	Below Average
19	Moderate	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	Good
20	Adequate	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	Average
21	Adequate	3/Good	2/Average	2/Average	3/Good	2/Average	2/Average	2/Average	2/Average	1/Below A	3/Good	3/Good	2/Average	Average
22	Low (Slight)	1/Below A	1/Below Ave	1/Below Avera	2/Average	2/Average	2/Average	1/Below	3/Good	2/Average	2/Average	1/Below	1/Below Average	Average
23	Adequate	4/Very Gd	3/Good	5/Excellent	2/Average	2/Average	3/Good	2/Average	4/Very Go	2/Average	2/Average	3/Good	3/Good	Very Good
24	Low (Slight)	1/Below A	1/Below Ave	1/Below Avera	1/Below A	1/Below Ave	3/Good	3/Good	1/Below A	1/Below A	1/Below A	1/Below	1/Below Average	Below Average
25	Highly Suf	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	Excellent
26	Moderate	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	Good
27	Moderate	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	3/Good	Good
28	Substanti	5/Excellent	5/Excellent	4/Very Good	5/Excellent	4/Very Good	4/Very Good	5/Excell	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	Excellent
29	Moderate	2/Average	2/Average	2/Average	5/Excellent	2/Average	3/Good	2/Average	3/Good	2/Average	3/Good	2/Average	2/Average	Good
30	Substanti	4/Very Gd	4/Very Good	4/Very Good	4/Very Go	4/Very Good	4/Very Good	4/Very G	4/Very Go	4/Very Gd	4/Very Gd	4/Very G	4/Very Good	Very Good
31	Highly Suf	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	5/Excellent	5/Excellent	5/Excell	5/Excellent	Excellent

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PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice	2.95	1.99	2.76	2.6	-0.16	Attained	Students are motivated to be part different chapters & institute level clubs. Students are also motivated to be the part of BOS and different departmental & institute level societies.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development	2.81	2.08	2.66	2.6	-0.06	Attained	There were many projects and reports that outlined through them the awareness of the role of the CO2 and its impact on the environment.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	2.95	2.07	2.77	2.6	-0.17	Attained	The molding of an individual personality by the engineer's culture, ethics and values is a matter of discipline and the responsibility of the engineering education. The aim of the education is to form the character of the student and the engineering profession.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings	2.96	2.12	2.79	2.6	-0.19	Attained	As a component of the education process, students are expected to work in teams. The aim of the education is to form the character of the student and the engineering profession.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	2.82	2.12	2.68	2.6	-0.08	Attained	Effectively, communication is a matter of discipline and the responsibility of the engineering education. The aim of the education is to form the character of the student and the engineering profession.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to	2.95	2.06	2.77	2.6	-0.17	Attained	There are many projects and reports that outlined through them the awareness of the role of the CO2 and its impact on the environment.

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**ANNEXURE - XVI**

***Curricula Feedback from Various Stakeholders***  
***for***  
***January - June 2023 Semester***  
***(Information Technology)***  
***[ITEM IT - 20]***

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### Analysis Report of Feedback on Course Curriculum Collected from various Stakeholders

S.No.	Feedback Report	Page No.
1.	COURSE CURRICULUM FEEDBACK by Students (Jan. 2023 to June 2023) (2 <sup>nd</sup> , 4 <sup>th</sup> , 6 <sup>th</sup> Sem)	1-5
2.	COURSE CURRICULUM FEEDBACK by Faculty (Jan. 2023 to June 2023) (2 <sup>nd</sup> , 4 <sup>th</sup> , 6 <sup>th</sup> Sem)	6-9

### Session wise analysis and impact report: Jan. 2023- June 2023 (2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup> Sem.)

Based on the feedback data received from total 318 (Approximate) students and 11 faculty members (Second, Fourth and Sixth semester- IT) for the academic session Jan. to June 2023, following points have been analysed:

- It has been observed that, in first semester 41.54% of students are strongly agreed, 31.74% of students are agreed, 20.01% of students are neutral, 4.39% of students are disagreed and 2.32% students are strongly disagreed with the syllabus/ content that they have studied in the 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> semester.
- Some students have suggested to remove:
  - Remove OOPs concepts from Python programming.
- Students have suggested to add
  - libraries, AI by python
- Students have suggested to add course under Honours, Minor specialization, Departmental electives and Open electives such as:
  - Computer Programming, Engineering mathematics etc.
- It has been observed that, in first semester 60% of faculty members are strongly agreed, 37.5% of faculty members are agreed, 1.25 are neutral, 1.25 are disagree with the curriculum, syllabus/ content that they have taught in the semesters.

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### COURSE CURRICULUM FEEDBACK (by Students on MOODLE): Sample Size: 30 (Avg.)

Subject Name	Student Feedback (Comments)		Response to student comments / Analysis
2160222/ Python Programming	Mention the course / contents which in your opinion is outdated & needs to be removed.	OOPS	OOPs is important part of programming. It can not be removed from syllabus
	Name course / contents which needs to be updated.	File Handling, Function, Python image library	Already part of syllabus and image library will cover in upcoming curriculum
	Is any new course required to meet current needs?	libraries, AI by python	Python libraries and AI by Python will be covered in upcoming semesters under the subject "Data science using python" and AIML.
	Honours:	Computer Programming	Already studied in 1st semester
	Minor specialization:	Artificial intelligence	Already part of curriculum
	Departmental electives:	Mathematics	Engineering Mathematics is part of curriculum.
	Open electives:	Eng. Physics	This will be covered under natural science and skill.
<b>Link</b>	<a href="https://drive.google.com/drive/folders/1XTh8PLt7zLVOF46oUbhSqIgKDxc9NsYW?usp=sharing">https://drive.google.com/drive/folders/1XTh8PLt7zLVOF46oUbhSqIgKDxc9NsYW?usp=sharing</a>		
<b>Action Taken (threshold value 3.5)</b>	After the compilation of data (student feedback for the courses they have studied), we have observed that students are quite satisfied with the courses they have studied. However they have suggested some courses/ up gradation in the existing syllabus. Moreover their suggestions are under consideration.		

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Subject Code / Subject Name (no. of students attempted feedback)	1. The course is well designed	2. The syllabus units are balanced	3. The course will be useful for you in future	4. The learning material was available to you	5. The content was clear and easy to understand	6. The course meets your expectations	7. The course was relevant and updated for present needs
2160221/Data Structures (23)	4.08695652	3.826087	3.695652	3.956522	4.086957	4	3.95
2160222/ Python Programming (31)	4.516129032	4.4516129	4.5806451	4.612903	4.483871	4.548387	4.5483871
2160223/DBMS (28)	3.857143	4	4	3.964286	4.142857	4.178571	4.285714
2160224/Computer System Organization (37)	4.378378378	4.3243243 24	4.3783783 78	4.243243243	4.21621622	4.27027	4.35135135
160411/Computer Graphics & Multimedia (35)	4.457142857	4	4	4.457143	4.171429	4.628571	4.57142857
160412/Software Engineering (60)	3.5	3.63	3.566667	3.6	3.65	3.633333	3.583333
160413/Computer Network (31)	3.806451613	3.8387096 77	3.6129032 26	4	3.93548387 1	3.8709677 42	3.838709677
100009/Cyber Security (18)	3.833333333	3.888889	3.8888888 89	3.555555556	3.72222222 2	4.0555555 6	3.888888889
160611/Compiler Design (10)	4.5	4.7	4.5	4.7	4.6	4.6	4.8
160612/Data Mining & Pattern Warehousing (27)	4.481481481	4.5555555 56	4.6666666 67	4.666666667	4.592593	4.592593	4.62963

11/5/16

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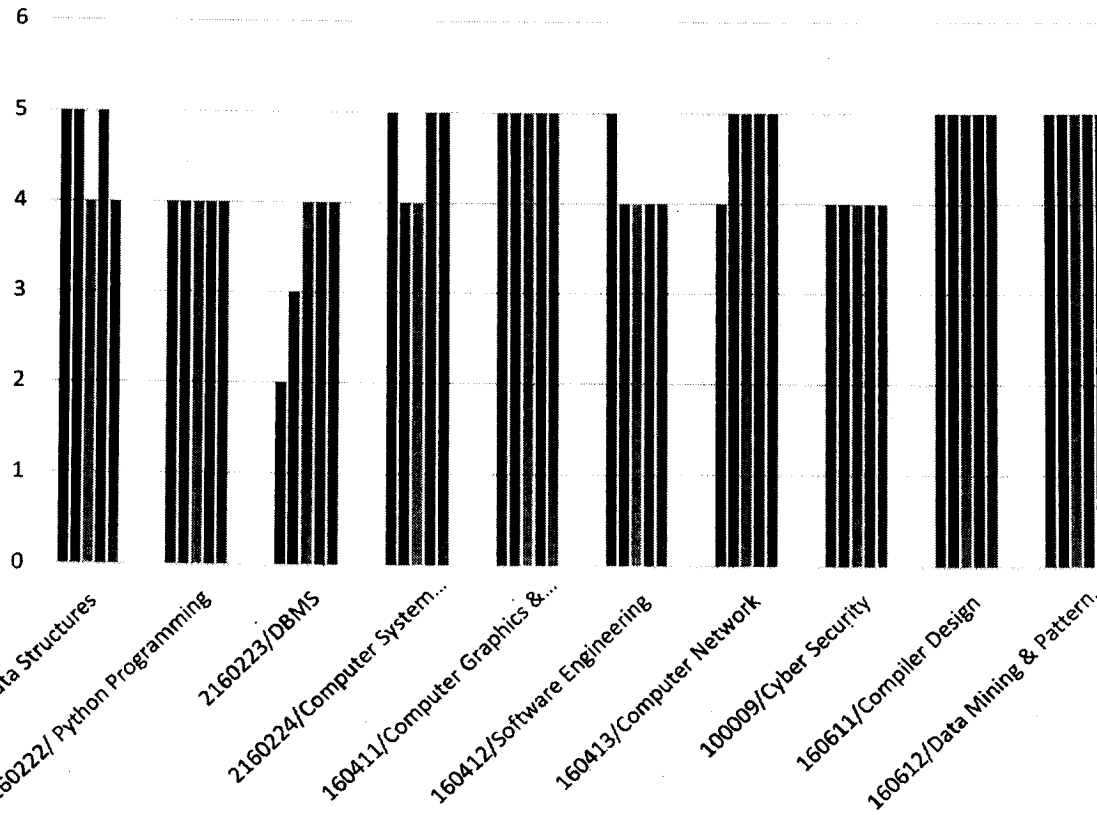
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160613/Artificial Intelligence & Machine Learning (18 )	4.222222222	4.277777777 78	4.166666666 67	4.055555556	4	3.888888888 89	4.055555556
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- 1. The availability of books & E-learning material in the institute is good. (Please give your opinion)
- 2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?
- 3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)
- 4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]
- 5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)
- 

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Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
2160221/Data Structures	2	Dr. Abhilash Sonker	28.57	48.45	16.77	1.24	4.97
2160222/ Python Programming	2	Dr. Dhananjay Bisen	43.60	29.80	22.17	3.69	0.74
2160223/DBMS	2	Dr. Bhagat Singh Raghuwanshi	32.94	37.70	21.43	7.54	0.40
2160224/Computer System Organization	2	Dr. Nookala Venu	39.38	40.15	17.37	2.70	0.39
160411/Computer Graphics & Multimedia	4	Bubul Agrawal	59.50	24.40	8.50	3.67	3.67
160412/Software Engineering	4	Shubha Mishra	29.80	16.75	39.90	14.04	1.23
160413/Computer Network	4	Dr. Vibha Tiwari	31.34	36.87	22.58	3.23	5.99
100009/Cyber Security	4	Dr. Akancha Twari	34.12	26.98	26.98	4.76	7.14
160611/Compiler Design	6	Dr. Abhilash Sonkar	65.71	31.43	2.86	0.00	0.00
160612/Data Mining & Pattern Warehousing	6	Dr. Vikram Rajpoot	66.14	27.51	6.35	0	0
160613/Artificial Intelligence & Machine Learning	6	Dr. Sunil Kumar Shukla	25.93	29.10	35.19	7.94	1.85
		<b>Average</b>	41.54	31.74	20.01	4.39	2.32

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### COURSE CURRICULUM FEEDBACK (by Faculty on MOODLE)

#### Action taken ( threshold value 3.5 )

As per given suggestions of faculty members, it is observed that most of the faculty members have satisfied with course content, curriculum/ syllabus and the related other parameters of first semester. The curriculum is capable of inculcating life-long learning abilities in students. Syllabus is updated as per the requirement of current scenario wrt Industry demand and research aspect as well.

#### Link:

<https://docs.google.com/spreadsheets/d/1o4BRRvIFDTqEiozbpTKu6IBGKNtsRKzX/edit?usp=sharing&oid=112550903938846637038&rtpof=true&sd=true>

S.N.	Faculty Name	Subject Code/ Subject Name	1. The availability of books & E-learning material in the institute is good. (Please give your opinion)	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]	5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)
1	Dr. Abhilash Sonker	2160221/Data Structures	5	5	4	5	4
2	Dr. Dhananjay Bisen	2160222/ Python Programming	4	4	4	4	4
3	Dr. Bhagat Singh Raghuvanshi	2160223/DBMS	2	3	4	4	4
4	Dr. Nookala Venu	2160224/Computer System Organization	5	4	4	5	5

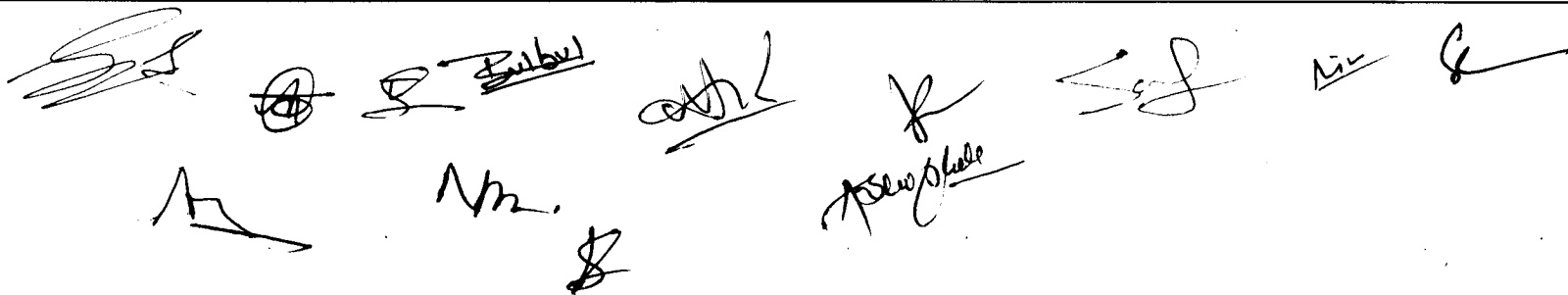
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5	Bubul Agrawal	160411/Computer Graphics & Multimedia	5	5	5	5	5
6	Shubha Mishra	160412/Software Engineering	5	4	4	4	4
7	Dr. Vibha Tiwari	160413/Computer Network (	4	5	5	5	5
8	Dr. Akancha Twari	100009/Cyber Security	4	4	4	4	4
9	Dr. Abhilash Sonkar	160611/Compiler Design	5	5	5	5	5
10	Dr. Vikram Rajpoot	160612/Data Mining & Pattern Warehousing	5	5	5	5	5
11	Dr. Sunil Kumar Shukla	160613/Artificial Intelligence & Machine Learning	4	4	5	4	5
Course Satisfaction Index (CSI) (on a scale of 5) (5: Strongly Agree, 4: Agree, 3: Neutral, 2: Disagree, 1: Strongly disagree)							

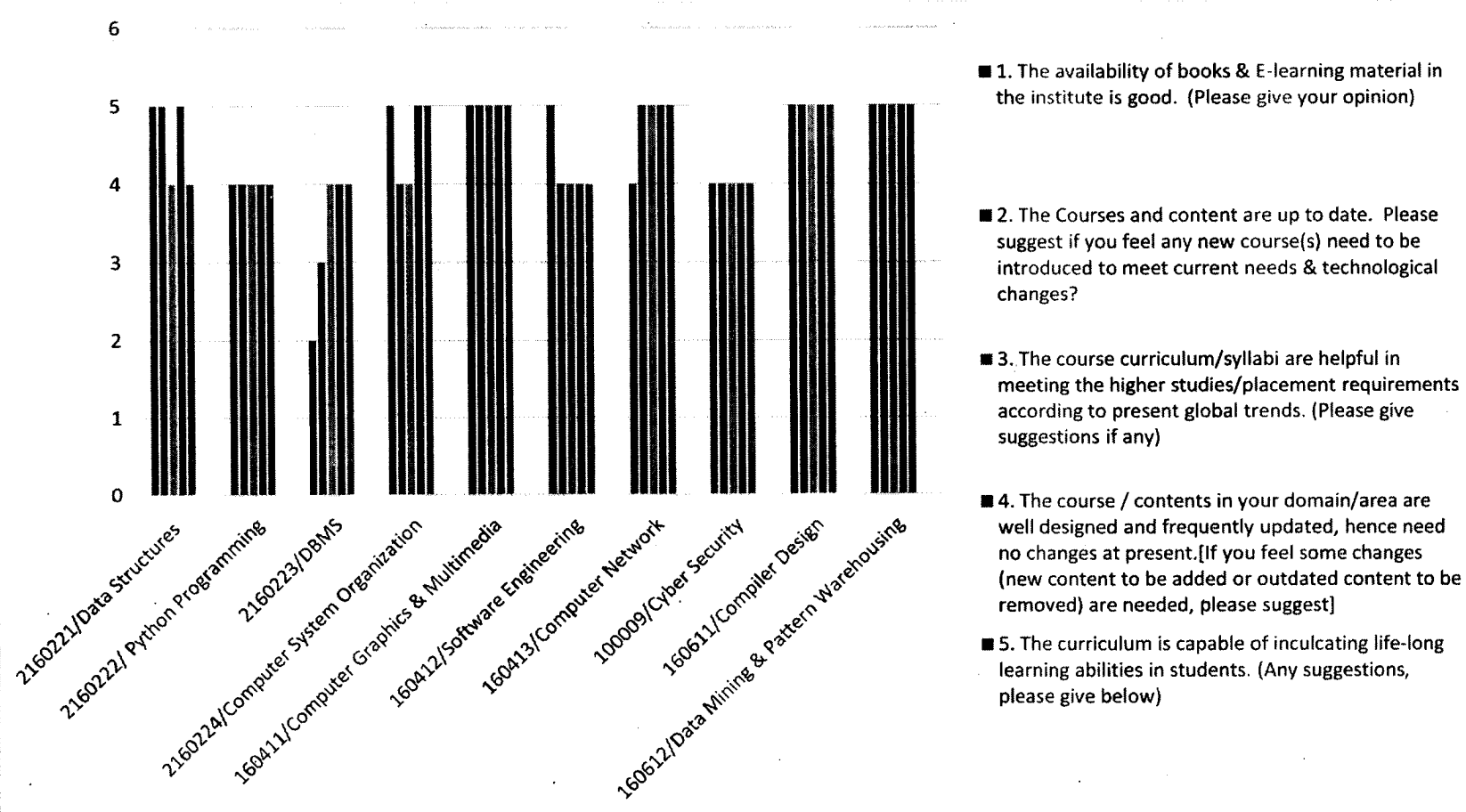
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### Alumni Feedback

#### Analysis and Impact Report:

Based on the feedback data received from total 48 Alumni of above mentioned batch following points have been analyzed:

- It has been analysed that 32.61% of students are strongly agreed, 50% of students are agreed, 15.22% of students are neutral, and 2.17% of students are disagreed with Course content which is interesting and as per Industry needs.
- It is found that 28.26 % of students are strongly agreed, 50% of students are agreed, 13.04% of students are neutral, and 8.69% of students are disagreed to apply, analyze, design and create products and solutions for real life engineering problems.

S. No.	Comments	Action Taken	Result
1	Need to more focus on programming using data structure, or split data structure in two parts so it will be beneficial for students to focus more and more.	To inculcate the habit of coding, mini skill project has already incorporated as a part of scheme.	Implemented
2	focus on development section, which is very useful for grab a job in service based companies	Mini skill project and proficiency in subjects enhance the students' power of thinking and coding.	Implemented
3	Try to add course regarding remove nervousness during interviews	Self-study & seminar gives a platform to the student where he can improve himself write communication.	Implemented
4	Small Projects based on domain should be given in every semester, so that students gain knowledge and develop interest	To inculcate the habit of coding, mini skill project has already incorporated as a part of scheme.	Implemented
5	Last 3 semester's subjects were totally from non IT background. Try to teach latest technology instead, so that it will be helpful for placements	According to the recent scenario, and request of so many students to teach at least 2-3 subjects from other discipline so that they can be more versatile.	Proposed for discussion

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6	More practical Labs than Theory classes	Try to add practicals where not included, and add more practicals where already included for practice.	Discussed
7	Constant updation of curriculum to be industry ready	Suggestions required from industry. Workshops will be conducted with them and will take meetings from alumni.	Implemented
8	focus more on AI and machine learning	This course has already added in higher semesters.	Implemented
9	Internship and coding please	As a part of curriculum, department offers internships to lower semester students and allow higher semester students to go for internships rather than project. Department placement cell also suggest them good company's for internships.	Implemented
10	Data science problem solving	This course has already added in higher semesters.	Implemented
11	Basic need of understanding of current technology management	Mini skill project and proficiency in subjects enhance the students' power of thinking and coding.	Implemented
12	More technology and companies must be invited for placements	T&P cell and department is trying to contact with many companies continuously.	In progress
13	Include more practical lectures than theoretical ones	Try to add practicals where not included, and add more practicals where already included for practice.	Discussed
14	It should include international courses too like Coursera and edx	Students are free for attend any international courses	Discussed

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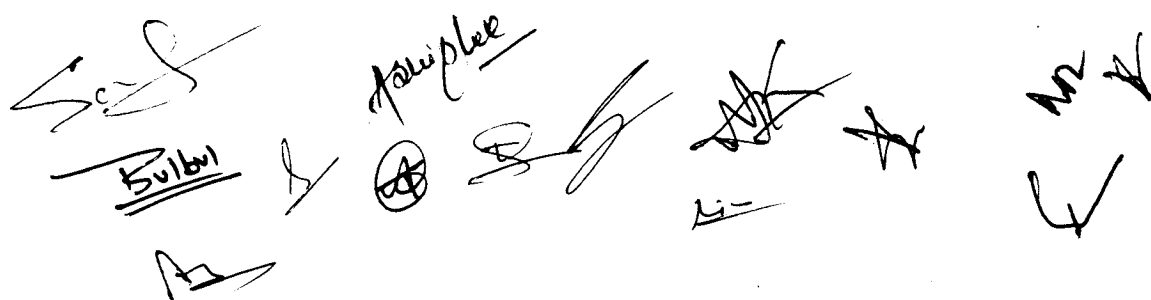
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PARAMETERS	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
Course content is interesting and as per Industry needs	15	24	7	1	1
Are you able To apply, analyze, design and create products and solutions for real life Engineering problems	13	24	6	4	1
Do you feel that you are capable of learning new things in the constantly changing technological world?	7	27	10	3	1
Do you find yourself capable of making a good career	7	29	10	2	0
Do you feel that you are able to manage projects in an ethical manner and work efficiently as a member/leader of multidisciplinary teams.	11	26	9	2	0
Courses meet contemporary requirements	6	27	13	2	0
Reading material regarding curriculum is easily available	7	22	18	1	0
Syllabus enhances employability	6	27	13	2	0
Link of the Alumni feedback	<a href="https://docs.google.com/spreadsheets/d/1hj_25OhnOoq8xWH9qY6tfzFoGqNZ0btTWTVXMBH4by4/edit?usp=sharing">https://docs.google.com/spreadsheets/d/1hj_25OhnOoq8xWH9qY6tfzFoGqNZ0btTWTVXMBH4by4/edit?usp=sharing</a>				







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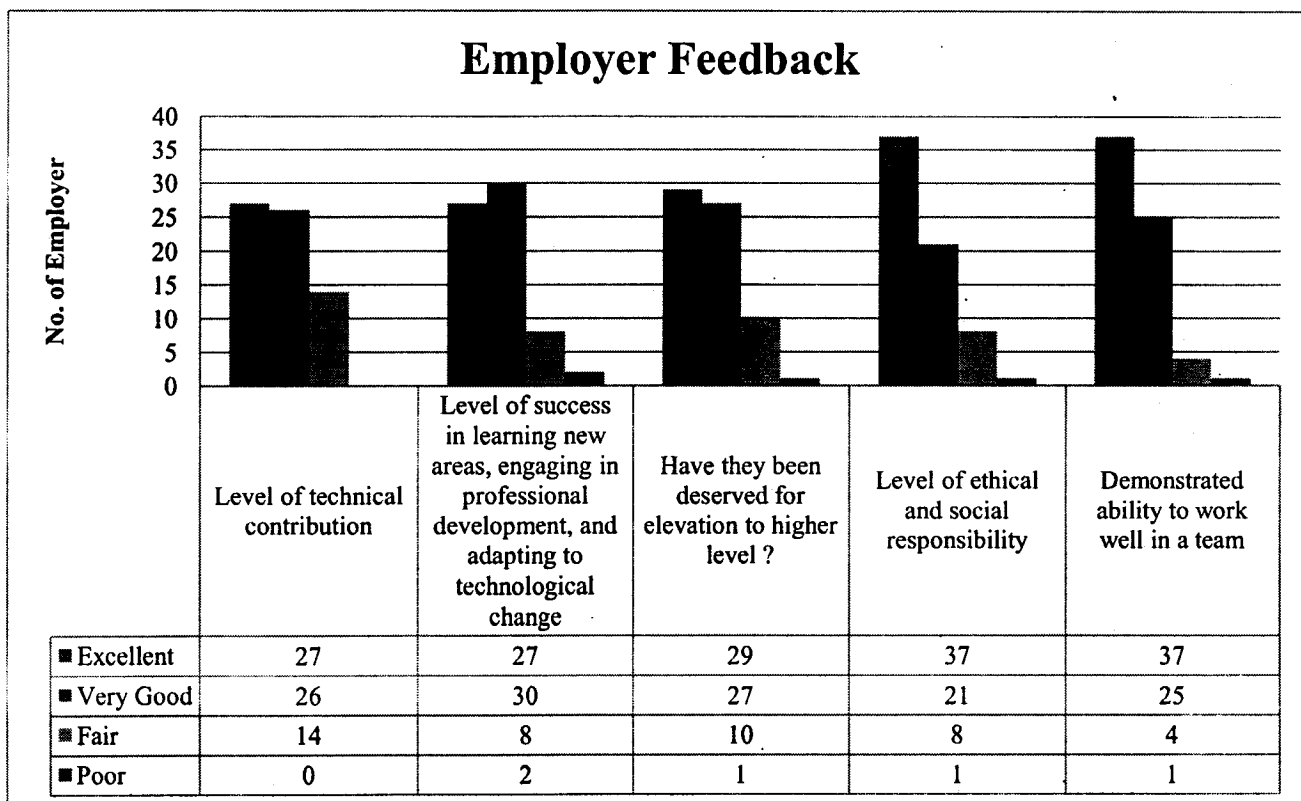
## Department of Information Technology

### EMPLOYER SATISFACTION SURVEY

Sample Size: 67

Parameter (MITS Student working under you or in your Organization)	Excellent	Very Good	Fair	Poor	Employer Satisfaction Index
Level of technical contribution	27	26	14	0	4.19
Level of success in learning new areas, engaging in professional development, and adapting to technological change	27	30	8	2	4.16
Have they been deserved for elevation to higher level?	29	27	10	1	4.22
Level of ethical and social responsibility	37	21	8	1	4.37
Demonstrated ability to work well in a team	37	25	4	1	4.43

Employer Satisfaction Index (ESI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Fair, 1: Poor)



#### Link of Employer Feedback

<https://docs.google.com/spreadsheets/d/10Ij8MtXBQSdv8H2bmHfxVIOvQM3qTL3q/edit?usp=sharing&ouid=109055627337813693303&rtpof=true&sd=true>

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**ANNEXURE - XVII**

*Scheme & Syllabi*  
*of*  
*M. Tech II Semester*  
*(Batch Admitted in 2023-24)*  
*(Information Technology)*  
*Under Flexible Curriculum*  
*[ITEM IT -21]*

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*M.D.*  
*03/01/2024*  
DEAN (ACADEMICS);  
M.I.T.S.  
GWALIOR  
(for Batch Admitted in 2023-24)

**Master of Technology (Information Technology) (Semester - II)**  
**Scheme of Examination**

S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per week			Total Credits	Mode of Exam
			Theory Slot			Practical Slot		MOOCs			L	T	P		
			End sem	Mid sem	Quiz/ Assignment	End Sem	Lab work/ sessional	Assignment	Exam						
1.	630211	Algorithms Design Techniques and Analysis	70	20	10	-	-	-	-	100	3	-	-	3	PP
2.	630212	Advanced Topics in Data Mining & Warehousing	70	20	10	-	-	-	-	100	3	-	-	3	PP
3.	630213	Image Processing and Retrieval Techniques	70	20	10	-	-	-	-	100	3	-	-	3	PP
4.	DE	Departmental Elective-II <sup>#</sup>	-	-	-	-	-	25	75	100	3	-	-	3	MCQ
5.	OC	Open Category Course <sup>##</sup> (OC-2)	-	-	-	-	-	25	75	100	3	-	-	3	MCQ
6.	630221	Lab-II*	-	-	-	90	60	-	-	150	-	-	4	4	SO
7.	630222	Self Learning / Presentation <sup>§</sup>	-	-	-	-	100	-	-	100	-	-	2	2	SO
<b>Total</b>			<b>210</b>	<b>60</b>	<b>30</b>	<b>90</b>	<b>160</b>	<b>50</b>	<b>150</b>	<b>750</b>	<b>15</b>	<b>-</b>	<b>6</b>	<b>21</b>	

<sup>#</sup> Elective-II course will run through SWAYAM / NPTEL / MOOC based learning platform (with credit transfer facility).

<sup>##</sup> Open Category course will have to be opted from the pool of open courses. This course will be based on interdisciplinary aspects. [This course may be run through SWAYAM/NPTEL based platform (with credit transfer facility)].

\* During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

<sup>§</sup> Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students bus assessment will be based on internal seminar presentation).

DE-2 <sup>#</sup> (through SWAYAM / NPTEL / MOOC)		
S. No.	Subject Code	Subject Name
1.	630217	Machine Learning for Engineering and science applications (12 Weeks)
2.	630218	Parallel Computer Architecture (12 Weeks)
3.	630219	Business Intelligence & Analytics (12 Weeks)

OC-2 <sup>##</sup> (through SWAYAM / NPTEL / MOOC)		
S. No.	Subject Code	Subject Name
1.		Data Analytics with Python (12 Weeks)
2.		Social Networks (12 Weeks)
3.		Data Science for Engineers (8 Weeks)

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Department of Information Technology

*Syllabi*  
*of*  
*Departmental Core (DC) Courses*  
*M.Tech II Semester*  
*(Information Technology)*

Department of Information Technology

**ALGORITHMS DESIGN TECHNIQUES AND ANALYSIS**  
**630211**

**UNIT I**

**Introduction:** Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Recursive and Non-recursive Algorithms, Empirical Analysis of Algorithms. Brute Force and Exhaustive Search- Sequential Search and Brute-Force String Matching, Closest-Pair and Convex-Hull Problems.

**UNIT II**

**Decrease-and-Conquer:** Topological Sorting, Fake-Coin Problem, Russian Peasant Multiplication, Josephus Problem, Computing a Median and the Selection Problem, Game of Nim. **Transform-and-Conquer:** 2-3 Trees, Horner's Rule and Binary Exponentiation, Computing the Least Common Multiple, Counting Paths in a Graph.

**UNIT III**

**Space and Time Trade-Offs:** Sorting by Counting, Input Enhancement in String Matching, Boyer-Moore Algorithm, Open Hashing (Separate Chaining), Closed Hashing (Open Addressing), B-Trees

**UNIT IV**

**Iterative Improvement:** Simplex Method, Maximum-Flow Problem, Maximum Matching in Bipartite Graphs, Stable Marriage Problem. **Limitations of Algorithm Power:** Lower-Bound Arguments, Trivial Lower Bounds, Information-Theoretic Arguments, Adversary Arguments, Problem Reduction, Decision Trees, Decision Trees for Sorting, Decision Trees for Searching a Sorted Array.

**UNIT V**

Introduction to P, NP, NP-Hard and NP-Complete, P and NP Problems - Partition problem, Bin-packing problem, NP-Complete Problems.

---

**Recommended Books:**

- Introduction to Design and Analysis of Computer Algorithms, 3<sup>rd</sup> Edition, Anany Levitin, Pearson Education
- 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.

*(Handwritten signatures and initials)*  
Bulbvi  
Aswath  
Sandeep  
Nir  
M

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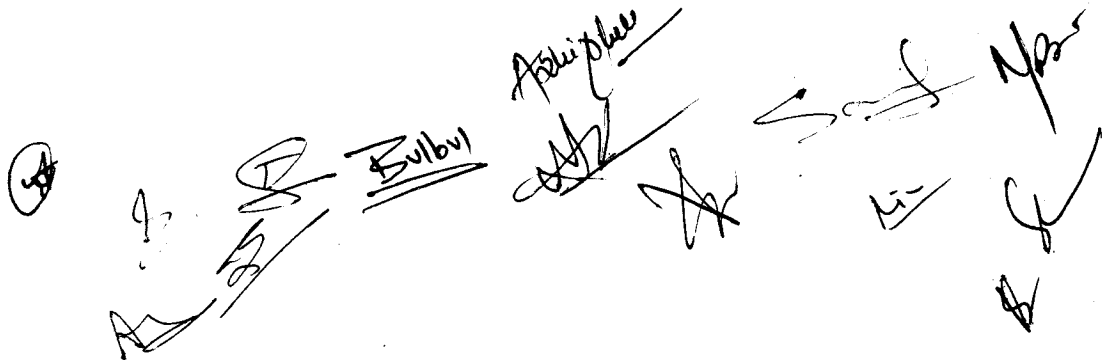
- Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India.

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### COURSE OUTCOMES

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

- CO1. outline the basics of data structures and algorithms.
  - CO2. interpret mathematical foundation in analysis of algorithms.
  - CO3. describe the working of different algorithmic design techniques.
  - CO4. compare the various algorithm design techniques.
  - CO5. select appropriate algorithm design techniques for solving problems.
  - CO6. design algorithms to solve real world engineering problems.
- 

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Department of Information Technology

**IMAGE PROCESSING AND RETRIEVAL TECHNIQUES**  
**630213**

**UNIT I**

Introduction to Image Processing Systems, Digital Image Fundamentals: - Image model, Relationship between Pixels, Imaging Geometry, Camera Model, Introduction to FT, DFT and FFT, Walsh Transformation, Hadamard Transformation, Histogram.

**UNIT II**

Image Preprocessing, Images Transformations, Brightness Transformation, Geometric Transformations, Image Smoothing, Neighborhood Averaging, Median Filtering, Low Pass Filters, Average of Multiple Images, Image Sharpening by Differentiation Technique, High Pass Filtering.

**UNIT III**

Image Restoration: Degradation Models for Continuous Function, Effect of Diagonalization, on-Degradation, Algebraic approach to Restoration, Interactive Restoration, Gray Level Interpolation, Inverse & Weiner Filter, FIR Wiener Filter, Filtering using Image Transforms.

**UNIT IV**

Image Encoding, Mapping, Quantizer and Coder. Image Segmentation, Detection of Discontinuation, Point Detection, Line Detection, Edge Detection, Boundary Extraction, Region Representation.

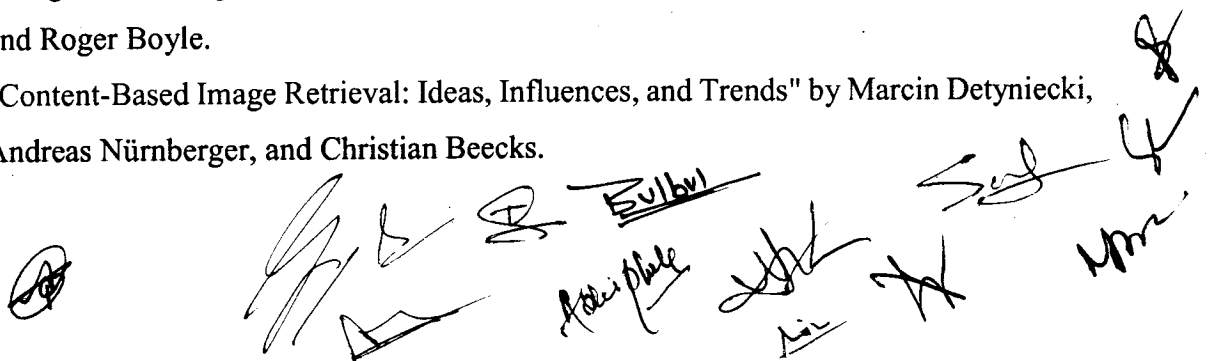
**UNIT V**

Introduction to Image Retrieval, Text, Content-based (CBIR), Multimodal Fusion and Semantic Based Image Retrieval, Query Models and Similarity Measures, Relevance Feedback in Image Retrieval, Neural Networks for Image Retrieval, Transfer Learning in Image Retrieval, Cross-Model, 3D and Multimodal Image Retrieval.

---

**Recommended Books:**

1. "Image Processing, Analysis, and Machine Vision" by Milan Sonka, Vaclav Hlavac, and Roger Boyle.
2. "Content-Based Image Retrieval: Ideas, Influences, and Trends" by Marcin Detyniecki, Andreas Nürnberger, and Christian Becks.

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