DMO 509
17/11/24

Board of Studies
Centre for Internet of Things

B.Tech.
Internet of Things
&
Internet of Things (IoT)

07 September, 2024

MADHAV INSTITUTE OF TECH & SCIENCE
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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed to be University)
Declared Under Distinct Category by Ministry of Education, Government of India
Centre for Internet of Things

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed to be University)
(Declared Under Distinct Category by Ministry of Education, Government of India)
NAAC Accredited with A++ Grade

Centre for Internet of Things

Minutes of Meeting

Date: 07-09-2024

Board of Studies (BoS) meeting of the Centre for Internet of Things was held in hybrid mode on **September 7th, 2024 from 12:00 Noon onwards**. The following external members were invited and attended the meeting in addition to the faculty members of the Centre for IoT:

S.No.	Name of Expert	Designation and Organization
➢	**Dr. Mukhtiyar Singh**	**Professor,** Electrical Engineering Department Delhi Technological University , Delhi
➢	**Dr. Anmol Ratna Saxena**	**Associate Professor** Department of Electrical Engineering NIT-Delhi

BoS Members:

1. **Dr. Praveen Bansal,** Coordinator, CoT
2. **Dr. Dhananjay Bisen,** Assistant Professor
3. **Dr. Saurabh Rajput,** Assistant Professor
4. **Dr. Bhavna Rathore,** Assistant Professor
5. **Dr. Aditya Dubey,** Assistant Professor

BoS Agenda Items

Item CIoT1	**To propose the scheme structure for the Batch admitted in 2024-25 academic session under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) (The total credits from I-VIII semester should not be less than 160 for this batch)** ➢ *The scheme structure of B. Tech. I Semester of B.Tech Internet of Things for the batch admitted in 2024-25 is prepared and is annexed at* ***ANNEXURE-1*** ➢ *The scheme structure of B. Tech. I Semester of B.Tech Internet of Things (IoT) for the batch admitted in 2024-25 is prepared and is annexed at* ***ANNEXURE-2***
Item CIoT2	**To review & finalize the syllabi for all courses of B. Tech I Semester (for batch admitted in 2024-25) under the flexible curriculum along with their COs** ➢ *The syllabus of B. Tech. I Semester of B.Tech Internet of Things for the batch admitted in 2024-25 is prepared and is annexed at* ***ANNEXURE-3*** ➢ *The syllabus of B. Tech. I Semester of B.Tech Internet of Things (IoT) for the batch admitted in 2024-25 is prepared and is annexed at* ***ANNEXURE-4***
Item CIoT3	**To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses and Micro Project-I to be offered in B.Tech. I semester along with their COs** ➢ *The Experiment list/ Lab manual for various laboratory courses to be offered in along with the Course Outcomes and Micro Projects-I of I semester of the B.Tech Internet of*

	Things students of 2024-25 admitted batch under the flexible curriculum is included at ***ANNEXURE-5*** ➢ *The Experiment list/ Lab manual for various laboratory courses to be offered in along with the Course Outcomes and Micro Projects-I of I semester of the B.Tech Internet of Things(IoT) students of 2024-25 admitted batch under the flexible curriculum is included at* ***ANNEXURE-6***
Item CIoT4	**To discuss and recommend the scheme structure for the Batch admitted in 2024-25 academic session & syllabi of I semester PG Programme under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) (M.E./M.Tech./MCA/MBA/MUP) along with their Course Outcomes (COs)** ***Not Applicable***
Item CIoT5	**To review and finalize the syllabus/module of Classified Novel Engaging Course to be offered in I semester of PG programme** ***Not Applicable***
Item CIoT6	**To review and finalize the scheme structure for the Batch admitted in 2024-25 academic session syllabi of Research Methodology and Ethics Ph.D. Programme under the Madhav Institute of Technology & Science-Deemed University (MITS-DU)** ➢ *The scheme structure of batch admitted in 2024-25 is annexed at* ***ANNEXURE-7*** ➢ *The syllabi of Research Methodology and Ethics is prepared and annexed at* ***ANNEXURE-8***
Item CIoT7	Any other matter.

The meetings ended with the vote of thanks by the BoS Coordinator.

BoS members of the centre

Dr. Bhavana Rathore Dr. Dhananjay Bisen Dr. Saurabh Rajput Dr. Aditya Dubey

External Members

Present online.
Dr. Mukhtiyar Singh
Professor, Department of Electrical Engineering,
DTU

Present online
Dr. Anmol Ratna Saxena
Associate Professor,
NIT-Delhi

Dr. Praveen Bansal
Coordinator,
Centre for Internet of Things

17/12/2024.
Dean
Faculty of Engineering & Technology
MITS-DU

Semester-Wise General Scheme Structure & Important Guidelines for Flexible Curriculum

(Batch admitted in Academic Session 2024-25 onwards)

Abbreviations Used

L	Lecture
T	Tutorial
P	Practical
HSMC	Humanities and Social Sciences including Management Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
DC	Departmental Core
DE	Departmental Elective
SPC	Specialization Courses
OC	Open Category
DLC	Departmental Laboratory Courses
MOOC	Massive Open Online Course
MWS	Mandatory Workshop
SP	Semester Proficiency
SIP	Skill Internship Program
SLP	Self-learning Presentation
PDC	Professional Development Component
PBL	Project Based Learning
PC	Professional Certification
MAC	Mandatory Audit Course
NEC	Novel Engaging Course

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

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Scheme of Evaluation

B. Tech. I Semester *Internet of Things*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment											
1.	22241101	DC	Principles of Internet of Things	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	22241102	ESC	Computer Programming	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
3.	22241103	DC	Engineering Measurement	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	22241104	DC	Digital Electronics and Logic Design	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	22241105	BSC	Linear Algebra and Calculus	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
6.	22241106	DLC	Computer Programming Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	22241107	DLC	Internet of Things Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	22241108	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	22241109	PBL	Micro Project-I[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	22241110	HSMC	Language Lab	-	-	-	-	70	30	100	-	-	2	1	Blended	AO	-
11.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
Total				100	100	150	150	330	170	1000	12	03	10	20	-	-	-
12.	22241111	MAC	Universal Human Values & Professional Ethics (UHVPE)	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
13.	22241112	MWS	Mandatory Workshop on Indian Constitution and Traditional Knowledge at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.																	
Skill Internship Program (Soft Skill): Minimum 45 hours duration: To be credited in II Semester.																	

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

[#]Micro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	1	1	3	0	0	0	2	1	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
15	0	01	02	02	06	02	08	-	06	20
75%	-	5%	10%	10%	30%	15%	40%		15%	Credits %

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Scheme of Evaluation

B. Tech. II Semester *Internet of Things*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	22241201	DC	Object-Oriented Programming	20	20	30	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	22241202	DC	Sensors and Actuators	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
3.	22241203	DC	IoT Architecture and Protocol	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	22241204	DC	Operating Systems	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5.	22241205	ESC	Basic Electrical and Electronics Engineering	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
6.	22241206	DLC	Object-Oriented Programming Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	22241207	DLC	Sensors and Actuators Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	22241208	DLC	Electrical and Electronics Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	SO	-
9.	22241209	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	22241210	PBL	Micro Project-II#	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
12.	SIPXXX	SIP	Skill Internship Program	-	-	-	-	42	18	60	-	-	-	2**	Experiential	SO	-
Total				100	100	150	150	372	188	1060	11	04	10	22	-	-	-
13.	22241211	MAC	Sustainability & Environmental Science	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
14.	22241212	MWS	Mandatory Workshop on Indian Knowledge System at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
Summer Semester of six-eight week duration will be conducted for makeup of I & II semester examination.																	

[$]Semester Proficiency - includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

**These credits will be transferred from Skill Internship Program

#Micro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

BSMC	BSC	ESC	DC	OE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	1	4	0	0	0	4	1	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
15	–	–	04	04	06	03	08	–	05	22
65.21%			17.39%	17.39%	27.27%	13.63%	36.36%		22.72%	Credits %

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Scheme of Evaluation

B. Tech. III Semester *Internet of Things*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	22242101	BSC	Probability and Statistics	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2Hrs
2.	22242102	DC	Microcontrollers and its interfacing	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
3.	22242103	DC	Data Structures	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
4.	22242104	DC	Electronic Devices and Circuits	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
5.	22242105	DC	Embedded System with ARM	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
6.	22242106	DLC	Problem Solving through Python Programming	-	-	-	-	70	30	100	-	-	2	1	Experiential	AO	-
7.	22242107	DLC	Data Structure Lab	-	-	-	-	70	30	100	-	-	2	1	Experiential	AO	-
8.	22242108	DLC	Microcontrollers and its interfacing Lab	-	-	-	-	70	30	100	-	-	2	1	Experiential	AO	
9.	22242109	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	22242110	PBL	Macro Project-I[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	22242111	SLP	Self-learning/Presentation[$$] (SWAYAM/NPTEL/MOOC)	-	-	-	-	40	-	40	-	-	2	1	Mentoring	SO	-
12.	NECXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
Total				100	100	150	150	370	170	1040	11	05	12	22	-	-	-
13.	22242112	MAC	Cyber Security	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
14.	22242113	MWS	Mandatory Workshop on Life Skills at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
Skill Internship Program (Institute Level) (Qualifier): Minimum 30 hours duration: To be credited in IV Semester																	

[$] Semester Proficiency – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

[#] Macro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

[$$] Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance and presentation.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	1	0	4	0	0	0	2	1	1	1	1	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
16	--	--	02	03	09	3	06	--	04	22
76.19%			9.52%	14.28%	42.85%	13.63%	28.57%		18.18%	Credits %

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Scheme of Evaluation

B. Tech. IV Semester *Internet of Things*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	22242201	DC	Data Science	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
2.	22242202	DC	Embedded Control of Electric Motors	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
3.	22242203	DC	Design and Analysis of Algorithms	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
4.	22242204	DC	IoT Cloud Security	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
5.	22242205	DC	Fundamentals of Signals and Control	20	20	30	30	-	-	100	3	-	-	3	Face to Face	MCQ	2Hrs
6.	22242206	DLC	Data Science Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	22242207	DLC	Design and Analysis of Algorithms Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	22242208	DLC	Competitive Programming	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
9.	22242209	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	22242210	PBL	Macro Project-II[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	22242211	PC	Professional Certification	-	-	-	-	50	-	50	-	-	2	1	Blended	SO	-
12.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
13.	SIPXXXX	SIP	Skill Internship Program	-	-	-	-	42	18	60	-	-	-	2**	Experiential	SO	-
			Total	100	100	150	150	422	188	1110	11	05	12	24	-	-	-
14.	22242212	MAC	Project Management, Economics & Financing	30	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
15.	22242213	MWS	Mandatory Workshop on Computer Vision at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
			Summer Semester of six-eight week duration will be conducted for makeup of previous semester examination.														
			Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree														

[$]Semester Proficiency – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

[#]Macro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

[**]These credits will be transferred from Skill Internship Project.

PC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	0	0	5	0	0	0	3	1	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
16	–	01	04	03	09	3	06	-	06	24
66.66%		4.16%	16.66%	12.5%	37.5%	12.5%	25%	-	25%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep. 2024

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Scheme of Evaluation

B. Tech. V Semester *Internet of Things*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	22243101	DC	Data Base Management System	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
2.	22243102	DC	IoT in Smart Grid	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
3.	22243103	DC	Artificial Intelligence & Machine Learning	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
4.	22243104	DE	Departmental Elective* (DE-1)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
5.	22243105	SPC	Specialization Course (SPC-1)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
6.	22245106	DLC	Data Base Management System Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	22243107	DLC	Artificial Intelligence & Machine Learning Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	22243108	SP	Semester Proficiency[$]	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	22243109	PBL	Cornerstone Project	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				80	80	120	120	260	90	25	75	850	11	04	10	20	-	-	-
10.	22243110	MAC	Supply Chain Management	20	20	30	30	-	-			100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	22243111	MWS	Mandatory Workshop on Blockchain at Department Level (Duration: Two Days)													GRADE	Interactive	MCQ	-
Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree																			

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

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

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	3	1	1	0	2	0	1	1	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
13	03	–	02	02	06	2	09	-	03	20
65%	15%		10%	10%	30%	10%	45%		15%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep. 2024

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Scheme of Evaluation

B. Tech. VI Semester *Internet of Things*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	22243201	DC	Industrial Internet of Things	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
2.	22243202	DC	Data Mining and Warehousing	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
3.	22243203	DE	Departmental Elective* (DE-2)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
4.	22243204	OC	Open Category Course (OC-1)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5.	22243205	SPC	Specialization Course (SPC-2)	20	20	30	30	-	-	-	-	100	3	-	-	3	Face to Face	PP	2Hrs
6.	22243206	DLC	Industrial Internet of Things Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	22243207	DLC	Advanced IoT Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experiential	AO	-
8.	22243208	SP	Semester Proficiency[$]	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	22243209	PBL	Capstone Project	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				80	80	120	120	260	90	25	75	850	12	03	10	20	-	-	-
10.	22243210	MAC	Disaster Management	20	20	30	30	-	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	22243211	MWS	Mandatory Workshop on Intellectual Property Rights at Department Level (Duration: Two Days)													GRADE	Interactive	MCQ	-

Skill Enhancement Program/Research Internship/On Job Training for Four weeks duration (Optional)

Summer Semester of six-eight week duration will be conducted for makeup of V & VI semester examination.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

[$] Semester Proficiency: includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

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

BSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	2	1	1	1	2	0	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
13	03	-	02	02	06	2	09	-	03	20
65%	15%		10%	10%	30%	10%	45%		15%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(Deemed to be University)

(Declared Under Distinct Category by Ministry of Education, Government of India)

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Centre for Internet of Things

Scheme of Evaluation

B. Tech. VII Semester *Internet of Things*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional											
1.	22244101	DE	Departmental Elective (DE-3)	20	20	30	30	-	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	22244102	DE	Departmental Elective* (DE-4)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	22244103	OC	Open Category Course (OC-2)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
4.	22244104	SPC	Specialization Course (SPC-3)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	22244107	SP	Semester Proficiency$	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
6.	22244108	DLC	Creative Problem Solving	-	-	-	-	70	30	-	-	100	-	-	2	1	Experiential	SO	-
Total				60	60	90	90	120	30	25	75	550	10	02	04	14	-	-	-
7.	22244109	MWS	Mandatory Workshop on Advanced Intellectual Property Rights at Department Level (Duration: Two Days)													GRADE	Interactive	MCQ	-

$Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

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

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	2	1	1	1	0	1	0	0	0	0	0	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
10	03	–	01	–	06	–	06	–	02	14
71.42%	21.42%		7.14%		42.85%		42.85%		14.28%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

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Centre for Internet of Things

Scheme of Evaluation

B. Tech. VIII Semester *Internet of Things*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment													
1.	22244201	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
2.	22244202	OC	Open Category Course* (OC-3)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	22244203	PBL	Industry Internship/ Research Internship/ Innovation & Start-up	-	-	-	-	280	120	-	-	400	-	-	20	10	Experiential	SO	-
4.	22244204	PDC	Professional Development[@]	-	-	-	-	-	50	-	-	50	-	-	4	2	Interactive	SO	-
Total				-	-	-	-	280	170	50	150	650	06	-	24	18	-	-	-
Summer Semester of six-eight week duration will be conducted to complete any backlog courses.																			
Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree																			

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

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

[@] 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.)

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
–	06	–	12	–	–	–	06	–	12	18
	33.33%		66.66%				66.66%		33.33%	Credits %

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Semester-Wise General Scheme Structure & Important Guidelines for Flexible Curriculum

(Batch admitted in Academic Session 2024-25 onwards)

Abbreviations Used

L	Lecture
T	Tutorial
P	Practical
HSMC	Humanities and Social Sciences including Management Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
DC	Departmental Core
DE	Departmental Elective
SPC	Specialization Courses
OC	Open Category
DLC	Departmental Laboratory Courses
MOOC	Massive Open Online Course
MWS	Mandatory Workshop
SP	Semester Proficiency
SIP	Skill Internship Program
SLP	Self-learning Presentation
PDC	Professional Development Component
PBL	Project Based Learning
PC	Professional Certification
MAC	Mandatory Audit Course
NEC	Novel Engaging Course

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

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Scheme of Evaluation
B. Tech. I Semester *Internet of Things(IoT)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional									
1.	23241101	DC	Principles of Internet of Things	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	23241102	ESC	Computer Programming	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
3.	23241103	DC	Engineering Measurement	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	23241104	DC	Digital Electronics and Logic Design	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	23241105	BSC	Linear Algebra and Calculus	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
6.	23241106	DLC	Computer Programming Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	23241107	DLC	Principles of Internet of Things Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	23241108	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	23241109	PBL	Micro Project-I[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	23241110	HSMC	Language Lab	-	-	-	-	70	30	100	-	-	2	1	Blended	AO	-
11.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
Total				**100**	**100**	**150**	**150**	**330**	**170**	**1000**	**12**	**03**	**10**	**20**	-	-	-
12.	23241111	MAC	Universal Human Values & Professional Ethics (UHVPE)	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
13.	23241112	MWS	Mandatory Workshop on Indian Constitution and Traditional Knowledge at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.																	
Skill Internship Program (Soft Skill): Minimum 45 hours duration: To be credited in II Semester.																	

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

[#]Micro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	1	1	3	0	0	0	2	1	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
15	0	01	02	02	06	02	08	-	03	20
75%	-	5%	10%	10%	30%	15%	40%		15%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

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Scheme of Evaluation
B. Tech. II Semester *Internet of Things(IoT)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
				Minor Evaluation I (PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional									
1.	23241201	DC	Object-Oriented Programming	20	20	30	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	23241202	DC	Sensors and Actuators	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
3.	23241203	DC	IoT Architecture and Protocol	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	23241204	DC	Operating Systems	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5.	23241205	ESC	Basic Electrical and Electronics Engineering	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
6.	23241206	DLC	Object-Oriented Programming Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	23241207	DLC	Sensors and Actuators Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	23241208	DLC	Basic of Electrical and Electronics Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
9.	23241209	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	23241210	PBL	Micro Project-II#	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
12.	SIPXXX	SIP	Skill Internship Program	-	-	-	-	42	18	60	-	-	-	2**	Experiential	SO	-
Total				100	100	150	150	372	138	1060	11	04	10	22	-	-	-
13.	23241211	MAC	Sustainability & Environmental Science	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
14.	23241212	MWS	Mandatory Workshop on Indian Knowledge System at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
Summer Semester of six-eight week duration will be conducted for makeup of I & II semester examination.																	

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

** These credits will be transferred from Soft Skill Internship

Micro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	1	4	0	0	0	4	1	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
15	--	--	04	04	06	03	08	--	05	22
65.21%			17.39%	17.39%	27.27%	13.63%	36.36%		22.72%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

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Scheme of Evaluation
B. Tech. III Semester *Internet of Things(IoT)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional									
1.	23242101	BSC	Probability and Statistics	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2Hrs
2.	23242102	DC	Embedded Systems and IoT	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
3.	23242103	DC	Data Structure	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
4.	23242104	DC	Electronic Devices and Circuits	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
5.	23242105	DC	Discrete Systems	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
6.	23242106	DLC	Problem Solving through Python Programming	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	23242107	DLC	Data Structure Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	23242108	DLC	Embedded Systems and IoT Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
9.	23242109	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	23242110	PBL	Macro Project-I[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	NECXXXX	SLP	Self-learning/Presentation[@@] (SWAYAM/NPTEL/MOOC)	-	-	-	-	40	-	40	-	-	2	1	Mentoring	SO	-
12.	SIPXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
Total				100	100	150	150	370	170	1040	11	05	12	22	-	-	-
13.	23242111	MAC	Cyber Security	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
14.	23242112	MWS	Mandatory Workshop on Life Skills at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
Skill Internship Program (Institute Level) (Qualifier): Minimum 30 hours duration: To be credited in IV Semester																	

[$]Semester Proficiency - includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

[#]Macro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

[@@]Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance and presentation.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	1	0	4	0	0	0	2	1	1	1	1	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
16	–	–	02	03	09	03	06	–	04	22
76.19%			9.52%	14.28%	40.90%	13.63%	27.27%		18.18%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

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Scheme of Evaluation
B. Tech. IV Semester *Internet of Things (IoT)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional									
1.	23242201	DC	Data Science	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
2.	23242202	DC	Computer Networks and Protocols	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
3.	23242203	DC	Design and Analysis of Algorithms	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
4.	23242204	DC	IoT Cloud Security	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
5.	23242205	DC	Theory of Computation	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2Hrs
6.	23242206	DLC	Data Science Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	23242207	DLC	Design and Analysis of Algorithms Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	23242208	DLC	Competitive Programming	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
9.	23242209	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	23242210	PBL	Macro Project-II[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	23242211	PC	Professional Certification	-	-	-	-	50	-	50	-	-	2	1	Blended	SO	-
12.	NECXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
13.	SIPXXXX	SIP	Skill Internship Program (Evaluation)	-	-	-	-	42	18	60	-	-	-	2**	Experiential	SO	-
Total				**100**	**100**	**150**	**150**	**422**	**188**	**1110**	**11**	**05**	**12**	**24**	**-**	**-**	**-**
14.	23242212	MAC	Project Management, Economics & Financing	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
15.	23242213	MWS	Mandatory Workshop on Computer Vision at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
Summer Semester of six-eight week duration will be conducted for makeup of previous semester examination.																	
Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree																	

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

[#]Macro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

**These credits will be transferred from Skill Internship Program.

PC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	0	0	5	0	0	0	3	1	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
16	--	01	04	03	09	03	06	-	06	24
66.66%		4.16%	16.66%	12.5%	37.5%	12.5%	25%	-	25%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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NAAC Accredited with A++ Grade
Centre for Internet of Things

Scheme of Evaluation
B. Tech. V Semester *Internet of Things (IoT)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	23243101	DC	Data Base Management System	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
2.	23243102	DC	Compiler Design	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
3.	23243103	DC	Artificial Intelligence & Machine Learning	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
4.	23243104	DE	Departmental Elective* (DE-1)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
5.	23243105	SPC	Specialization Course (SPC-1)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
6.	23243106	DLC	Data Base Management System Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	23243107	DLC	Artificial Intelligence & Machine Learning Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	23243108	SP	Semester Proficiency$	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	23243109	PBL	Cornerstone Project	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				80	80	120	120	260	90	25	75	850	11	04	10	20	-	-	-
10.	23243110	MAC	Supply Chain Management	20	20	30	30	-	-			100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	23243111	MWS	Mandatory Workshop on Block chain at Department Level (Duration: Two Days)													GRADE	Interactive	MCQ	-
Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree																			

$Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

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

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	3	1	1	0	2	0	1	1	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
13	03	–	02	02	06	2	09	-	03	20
65%	15%		10%	10%	30%	10%	45%		15%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep. 2024

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Scheme of Evaluation
B. Tech. VI Semester *Internet of Things(IoT)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional											
1.	23243201	DC	Industrial Internet of Things	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2Hrs
2.	23243202	DC	IoT Web Technologies	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2Hrs
3.	23243203	DE	Departmental Elective* (DE-2)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
4.	23243204	OC	Open Category Course (OC-1)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5.	23243205	SPC	Specialization Course (SPC-2)	20	20	30	30	-	-	-	-	100	3	-	-	3	Face to Face	PP	2Hrs
6.	23243206	DLC	Industrial Internet of Things Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	23243207	DLC	Problem Solving Through JAVA Programming Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	23243208	SP	Semester Proficiency[$]	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	23243209	PBL	Capstone Project	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				80	80	120	120	260	90	25	75	850	12	03	10	20	-	-	-
10.	23243210	MAC	Disaster Management	20	20	30	30	-	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	23243211	MWS	Mandatory Workshop on Intellectual Property Rights at Department Level (Duration: Two Days)													GRADE	Interactive	MCQ	-
Skill Enhancement Program/Research Internship/On Job Training for Four weeks duration (Optional)																			
Summer Semester of six-eight week duration will be conducted for makeup of V & VI semester examination.																			
Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree																			

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

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

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	2	1	1	1	2	0	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
13	03	–	02	02	06	2	09	–	03	20
65%	15%		10%	10%	30%	10%	45%		15%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

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Scheme of Evaluation
B. Tech. VII Semester *Internet of Things (IoT)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment		Lab Work & Sessional											
1.	23244101	DE	Departmental Elective (DE-3)	20	20	30	30	-	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	23244102	DE	Departmental Elective* (DE-4)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	23244103	OC	Open Category Course (OC-2)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
4.	23244104	SPC	Specialization Course (SPC-3)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	23244105	SP	Semester Proficiency[$]	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
6.	23244106	DLC	Creative Problem Solving	-	-	-	-	70	30	-	-	100	-	-	2	1	Experiential	SO	-
Total				60	60	90	90	120	30	25	75	550	10	02	04	14	-	-	-
7.	23244107	MWS	Mandatory Workshop on Advanced Intellectual Property Rights at Department Level (Duration: Two Days)													GRADE	Interactive	MCQ	-

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

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

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PRL	MAC	MWS
0	0	0	0	2	1	1	1	0	1	0	0	0	0	0	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
10	03	–	01	–	06	–	06	–	02	14
71.42%	21.42%		7.14%		42.85%		42.85%		14.28%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

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Scheme of Evaluation

B. Tech. VIII Semester *Internet of Things(IoT)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I(PP)	Minor Evaluation II(PP)	Quiz/ Assignment													
1.	23244201	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
2.	23244202	OC	Open Category Course* (OC-3)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	23244203	PBL	Industry Internship/ Research Internship/ Innovation & Start-up	-	-	-	-	280	120	-	-	400	-	-	20	10	Experiential	SO	-
4.	23244204	PDC	Professional Development[@]	-	-	-	-	-	50	-	-	50	-	-	4	2	Interactive	SO	-
Total				-	-	-	-	280	170	50	150	650	06	-	24	18	-	-	-
Summer Semester of six-eight week duration will be conducted to complete any backlog courses.																			
Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree																			

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

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

[@] 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.)

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory				Lab	
Face to Face	Online	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	
–	06	–	12	–	–	–	06	–	12	18
	33.33%		66.66%				66.66%		33.33%	Credits %

Recommended in BoS Meeting of CIoT held on 07 Sep, 2024

ITEM-2

To review & finalize the syllabi for all courses of B. Tech I Semester (for batch admitted in 2024-25) under the flexible curriculum along with their COs.

PRINCIPLES OF INTERNET OF THINGS: 22241101

Course Objective:

- Grasp the key concepts of IoT, including its definition, evolution, functional blocks, and privacy/security challenges.
- Learn about IoT communication networks and protocols across different layers, ensuring efficient and secure data transmission.

Unit I – Introduction to Internet of Things (IoT): Definition and Importance, Characteristics of IoT,Evolution of IoT, Functional Blocks of IoT: Physical and Logical, Three-Layer, Five-Layer and OSI Model of IoT. Design Constraints, Privacy and Security Challenges.

Unit II – IoT Communication Network and Protocols: Communication Network Based on Size of IoT Applications: Home Area Network (HAN), Neighborhood Area Network (NAN), Field Area Network (FAN), Wide Area Network (WAN), Wireless Sensor Networks (WSNs), IoT Protocols: Data Link Layer, Network Layer, and Application Layer.

Unit III – Sensors, Actuators and Controllers IoT Sensor Classifications: Based on Working Principle, Measured Physical Quantity, Signals Detected, and Applications. Actuator Classifications: Based on Type of Energy Used, Motion, Control Methods. IoT Controllers: Arduino:Nano, Uno, and Mega.

Unit IV – Cloud Computing and Data Analysis: Introduction to Cloud Computing, Definitions and Characteristics Concept of Cloud, Classifications of Cloud, Data Analytics: Data Collection, Data Cleaning and Pre-processing, Exploratory Data Analysis, Data Modelling, Interpretation of Data, and Implementation, Data Management Challenges.

Unit V – IoT Applications: Business Models for The Internet of Things, Smart City, Smart Mobility and Transport, Industrial IoT, Smart Health, Environment Monitoring and Surveillance, Home Automation, Smart Agriculture etc.

Course Outcomes:

After the completion of the course, the student will be able to –

CO 1. **Explain** the IoT fundamentals, architectural models, and associated design and security challenges
CO 2. **Analyze** IoT communication networks and protocols across different layers
CO 3. **Classify** sensors, actuators, and IoT controllers
CO 4. **Apply** cloud computing concepts and data analysis techniques within IoT systems
CO 5. **Explore** IoT applications in various domains

Reference/ Text Books:

1. ***Internet of Things: Principles and Paradigm*** *by Rajkumar Buyya and Amir Vahid Dastjerdi, Morgan Kaufmann, 2016.*
2. ***The Internet of Things: Key Applications and Protocols*** *by Olivier Hersent, David Boswarthick, and Omar Elloumi, Wiley, 2012.*
3. ***IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things*** *by David Hanes, Gonzalo Salgueiro, and Patrick Grossetete, Cisco Press, 2017.*
4. ***Internet of Things (A Hands-on-Approach)*** *by Arshdeep Bahga and Vijay Madisetti, VPT, 2014.*
5. ***Internet of Things: Architecture and Design Principles*** *by Raj Kamal, McGraw Hill Education, 2017.*

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	2	2	1	1	1	1	3	2	-
CO2	3	3	3	1	1	1	1	1	1	1	1	3	2	-
CO3	3	3	3	1	2	1	2	1	1	1	1	3	2	-
CO4	3	3	3	2	3	1	2	1	1	1	1	3	3	-
CO5	3	3	3	2	3	3	3	1	1	1	1	3	3	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

COMPUTER PROGRAMMING: 22241102

Course Objectives:

- To understand the fundamentals of C programming including keywords, data type, functions etc.
- To acquire the ability to write a computer program to solve specified problems.
- To familiar with program structure and debugging process.
- To implement basic programming solutions using array, pointer, structures and file handling.

Unit 1: Introduction to C Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution, Translation Process and compiler Installation, Problem solving using Algorithms and Flowcharts, Identifiers, Data Types, Constants, Keywords, Input/output Instruction, Operators and Expressions, Precedence of operators, ASCII codes.

Unit 2: Decision Control, if statement, if-else statement, Nested if else statements, if else ladder, The conditional expression, Switch statement, Loops, While loop, do-while loop, For loop, nesting of for loops, Break and continue statement.

Unit 3: Array, type of array, One dimensional Arrays, 2D array, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, type of pointers, Application of pointers, Pointer to Pointer, Pointer to Array, Array of Pointers, Pointer to Strings.

Unit 4: Function Basics, Function Prototypes, Call by value, call by reference, passing string and array to function, Function returning address, Recursion, Structures, Dynamic memory allocation by malloc/calloc function, Union, Enumerators, typedef in c.

Unit 5: File Handling, Defining and Opening a file, reading and writing in file, Closing Files, Input/output Operations on Files, Predefined Streams, Storage class, preprocessor commands, Command Line Arguments.

Recommended Books:

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

Course Outcomes:

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

CO1. **Define** basic programming terms, syntax, algorithm and flow chart.
CO2. **Solve** computational problems using decision control and loops.
CO3. **Design** a program using the concept of Array, pointer and functions.
CO4. **Explore** file handling operations to work efficiently with files.
CO5. **Apply** programming concept to implement, debug and test any C program.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	2	1	1	1	1	1	1	3	-	-
CO2	3	2	1	1	3	1	1	1	1	1	1	3	-	-
CO3	3	3	3	3	3	2	1	1	1	1	2	3	-	-
CO4	3	2	2	1	3	2	1	1	1	1	3	3	-	-
CO5	3	3	3	3	3	3	2	1	1	1	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
Deemed University
(Declared under Distinct Category by Ministry of Education, Government of India)
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MITS

Centre for Internet of Things

ENGINEERING MEASUREMENT: 22241103

Course Objectives: The course aims to enhance the students' proficiency in engineering measurement techniques, including the identification and correction of measurement errors.

UNIT - I: Fundamentals of Measurement: Measurement system& types, Characteristics of measurement, Errors in Measurement & their source, Types of errors, Systematic and random errors in measurement, Expression of uncertainty, Accuracy and Precision.

UNIT - II: Analog Measurements: Basic electrical parameters- Current, Voltage, Frequency, Power, Power factor, Energy, RMS value, Average value; Analog Measurements using- PMMC, Moving Iron, Single phase dynamometer Wattmeter, Extension of range in PMMC, Energy meters.

UNIT - III: Digital Measurements: Digital voltmeter, Digital multimeter, Fundamentals of DSO: Measurement of Voltage, Current, Phase, Time period& Frequency, Basics of ECG, EEG, EMG, ERG waveforms, Comparison of analog and digital measurements.

UNIT - IV: Measurement of Electrical component's properties: Electrical components and their properties-Resistance, Inductance Capacitance and Impedance; Measurement of Resistance, Introduction to AC bridges for inductance and capacitance measurement.

UNIT - V: Renewable Energy Measurement: Measurement of direct and diffuse solar irradiance using pyrheliometer and pyranometer, Wind speed and direction measurement by anemometer, Humidity measurement using hygrometer, luminance Measurement using Lux meter, Energy management using Smart meters.

Text& Reference Books:

1. *A K Sawhney, "**Electrical & Electronic Measurement & Instrument**", Dhanpat Rai &Sons.*
2. *BC Nakra& K. Chaudhary, "**Instrumentation, Measurement and Analysis**," TMH 2nd Edition.*
3. *Purkait, "**Electrical & Electronics Measurement & Instrumentation**", TMH.*
4. *Robert B Northrop, "**Introduction to Instrumentation and Measurements.**" CRC Press, 2nd edition.*
5. *John Twidell and Tony Weir, "**Renewable Energy Resources**," Routledge, Taylor & Francis.*

Course Outcomes:

After successful completion of course, the students will be able to-

CO1: **Explain** the types and characteristics of measurement systems, errors and remedies.
CO2: **Describe** basic electrical parameters and their analog measurement methods.
CO3: **Apply** digital measurement techniques to measure electrical and electronic parameters.
CO4: **Describe** measurement of electrical component properties with the help of bridges.
CO5: **Explain** basic renewable energy parameters and their measurement methods.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	2	1	1	1	1	1	1	3	-	-
CO2	3	2	1	1	3	1	1	1	1	1	1	3	-	-
CO3	3	3	3	3	3	2	1	1	1	1	2	3	-	-
CO4	3	2	2	1	3	2	1	1	1	1	3	3	-	-
CO5	3	3	3	3	3	3	2	1	1	1	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

DIGITAL ELECTRONICS AND LOGIC DESIGN: 22241104

Course Objectives:

- To familiarize the students with the number representation and conversion between various representations in digital electronic circuits.
- To expose the students to the logical operations using combinational logic circuits, sequential logic circuits and the characteristics of memory and their classification.

Unit I. Number System: Representation of Binary numbers, octal and hexadecimal numbers, complements, signed binary numbers, Binary codes, code conversion, floating-point numbers and arithmetic, and the conversion process. Subtraction using 1's and 2's complement, Excess 3, Gray code, Hamming Code.

Unit II. Boolean Algebra and Logic Gates: Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms- SOP & POS. Logical operations, truth tables, logic gates, logic levels, and pulse waveforms. Simplification of Boolean functions: The map method- the Karnaugh map, minimal SOP & POS, Don't care conditions, multiple output minimization, tabular method, determination, and selection of prime implicants.

Unit III. Combinational Logic Circuits: Introduction: Design Procedure, adder, subtractor, Magnitude Comparator, Universal Gate, Encoders, Decoders, Multiplexers, Demultiplexer, Parity Checker Generator.

Unit IV. Sequential Logic Circuits: State tables and diagrams, Flip Flop and its various types -S-R, J-K, D and T Flip Flops, Excitation table, Triggering of FFs & Latches. Registers: - Shift – Registers, Ripple Counters, Synchronous Counters. Ring Counters. Timing Sequences, design procedure.

Unit V: Memory and Programmable Logic Device: Introduction to Digital Logic families (RTL, DTL, TTL, ECL, CMOS & Schottky logic) and their special characteristics: Fan-Out, Fan in, power dissipation, the figure of merit, Noise Margin; Circuits of Logic Families, RAM, ROM, A/D And D/A converters and their types.

Recommended Books:

1. *Digital Design by **Morris Mano**, Pearson Education, 6th edition 2018*
2. *Logic Design Theory by **N.N. Biswas**,Prentice Hall India Learning Private Limited,1993*
3. *Digital Fundamental by **T.L. Floyd**, Pearson Education, 11th edition, 2017*

Course Outcomes:

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

- **CO 1.** **Perform** conversion among Different number systems and codes.
- **CO 2.** **Simplify** the logic expressions using Boolean laws, and map methods and design them by using logic gates.
- **CO 3.** **Design** a given digital combinational circuit using basic gates for different applications.
- **CO 4.** **Analyze** different types of flip-flops and design a sequential logic circuit
- **CO 5.** **Apply** the concepts the basics of Logic family to design digital circuits

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	2	1	1	1	1	1	1	3	-	-
CO2	3	2	1	1	3	1	1	1	1	1	1	3	-	-
CO3	3	3	3	3	3	2	1	1	1	1	2	3	-	-
CO4	3	2	2	1	3	2	1	1	1	1	3	3	-	-
CO5	3	3	3	3	3	3	2	1	1	1	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

LINEAR ALGEBRA & CALCULUS: 22241105

Course Objectives:

- To understand the concept Matrices and its applications
- To understand the various aspect of algebraic structures'
- To expose the concept of ordinary and partial differentiation
- Evaluation of improper integrals using Beta and Gamma functions.
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

Unit1: Matrix, Rank of Matrix, Echelon form, Normal form of matrix, Solution of simultaneous equation by elementary transformation, Consistency of equation, Eigen values and Eigenvectors, Normalized eigenvector, Cayley Hamilton theorem and its application to finding inverse of matrix.

Unit2: Introduction to Groups and Field, Vector spaces over the field, linear dependent vectors and linear independent vectors, linear combination of vectors, linear span of a set of vectors, basis and dimension of a vector space.

Unit 3: Differential Calculus –I : nth Derivative ,Leibnitz's theorem, Partial derivatives, Euler's theorem for homogeneous functions, Total derivatives, Change of variables.

Unit 4: Differential calculus-II : Taylor's and Maclaurin's Theorems, Expansion of function of several variables, Jacobian, properties of Jacobian, Approximation of errors, Extrema of functions of several variables (Maxima and Minima of function of one and two variables), Lagrange's method of multipliers (Simple applications).

Unit 5: Integral Calculus Beta and Gamma function and its properties, transformation of Beta function, Gama functions, transformation of Gama function, relation between Beta and Gama function, Double and triple integrals, Change of order of integration, Application of Integration to Volumes and Surface areas.

Course Outcomes

After completing this course, student will be able to:

CO1	Application of various matrix in engineering problems
CO2	Analytical Solution of Algebraic Structures
CO3	Use of Differential Calculus
CO4	Apply Differential Calculus in basic Engineering Problems
CO5	Use integration techniques to determine the solution of various complex problems

Recommended Books:

1. E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
2. C.L Liu: Discrete Mathematics, 4th Edition 2012.
3. R. K. Jain, S. R. K. Iyengar: Advance Engineering Mathematics, Narosa Publishing House Pvt.Ltd, 5th Edition (2016).
4. F. B .Hildebrand: Advanced Calculus for application, Englewood Cliffs, N. J. Prentice- Hall, 2nd Edition (1980).
5. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015)..
6. B.V. Ramanna: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

Centre for Internet of Things

UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS: 22241111

Course Objectives:

The objective of the course is fourfold:

1. Sensitization of students towards self, family (relationship), society, and nature.
2. Understanding (or developing clarity) of nature, society, and larger systems, on the basis of human relationships and resolved individuals.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Content:

1: Course Introduction - Need, Basic Guidelines, Content, and Process for Value Education:

- Self-Exploration – what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation as the process for self-exploration.
- Continuous Happiness and Prosperity - A look at basic Human Aspirations.
- Right understanding, Relationship, and Physical Facility - The basic requirements for the fulfillment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario.

2: Understanding Harmony in the Human Being:

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
- Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer).
- Understanding the characteristics and activities of 'I' and harmony in 'I'.
- Understanding the harmony of 'I' with the Body.

3: Understanding Harmony in the Family and Society - Harmony in Human-Human Relationship:

- Understanding values in human-human relationships; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of the relationship.
- Understanding the meaning of Trust; Difference between intention and competence.
- Understanding the meaning of Respect; Difference between respect and differentiation; the other salient values in the relationship.
- Understanding the harmony in society (society being an extension of family): Resolution, Prosperity, Fearlessness (trust), and Co-existence as comprehensive Human Goals.
- Visualizing a universal harmonious order in society.

4: Understanding Harmony in Nature and Existence - Existence as Coexistence:

- Understanding the harmony in Nature.
- Interconnectedness and mutual fulfillment among the four orders of nature; recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space.
- Holistic perception of harmony at all levels of existence.

5: Holistic Understanding of Harmony on Professional Ethics:

- Natural acceptance of human values.
- Definitiveness of Ethical Human Conduct.
- Basis for Humanistic Education, Humanistic Constitution, and Humanistic Universal Order.
- Competence in professional ethics:
  a. Ability to utilize the professional competence for augmenting universal human order.

b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.
c. Ability to identify and develop appropriate technologies and management patterns for the above production systems.

- Strategy for transition from the present state to Universal Human Order:
  a. At the level of individual: as socially and ecologically responsible engineers, technologists, and managers.
  b. At the level of society: as mutually enriching institutions and organizations.

Gender Sensitization:

- Introduction to Sex, Gender & Culture.
- Introduction to Women Studies and Socialization, including man-woman relationship, work distribution.
- A brief review of Feminism, Patriarchy, Feminist Studies, Feminist Ideologies.
- Women and Law: Constitutional Provisions and Fundamental Rights related to Women.

Course Outcomes:

At the end of the course, the student will be able to:

- **CO1.** Become more aware of their surroundings, society, social problems, and their sustainable solutions.
- **CO2.** Become sensitive to their commitment towards what they believe in (humane values, humane relationships, and humane society).
- **CO3.** Apply what they have learned to their own self in different day-to-day settings in real life.
- **CO4.** Sustain human relationships and human nature in mind.
- **CO5.** Have better critical ability.
- **CO6.** Negotiate living in harmony with self and others.

Text Book:

1. *Human Values and Professional Ethics* by R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010.

Reference Books:

1. *Jeevan Vidya: Ek Parichaya* by A. Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. *Human Values* by A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* by Mohandas Karamchand Gandhi.
5. *On Education* - J. Krishnamurthy.
6. *Siddhartha* by Hermann Hesse.
7. *Old Path White Clouds* by Thich Nhat Hanh.
8. *On Education* - The Mother.
9. *Diaries of Anne Frank* by Anne Frank.
10. *Life and Philosophy of Swami Vivekananda*.
11. *Swami Vivekananda on Himself*.
12. *Small is Beautiful* by E.F. Schumacher.
13. *Slow is Beautiful* by Cecile Andrews.
14. *Economy of Permanence* by J.C. Kumarappa.

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MITS
Centre for Internet of Things

ITEM-2

To review & finalize the syllabi for all courses of B. Tech I Semester (for batch admitted in 2024-25) under the flexible curriculum along with their COs.

PRINCIPLES OF INTERNET OF THINGS: 23241101

Course Objective:

- Grasp the key concepts of IoT, including its definition, evolution, functional blocks, and privacy/security challenges.
- Learn about IoT communication networks and protocols across different layers, ensuring efficient and secure data transmission.

Unit I – Introduction to Internet of Things (IoT): Definition and Importance, Characteristics of IoT,Evolution of IoT, Functional Blocks of IoT: Physical and Logical, Three-Layer, Five-Layer and OSI Model of IoT. Design Constraints, Privacy and Security Challenges.

Unit II – IoT Communication Network and Protocols: Communication Network Based on Size of IoT Applications: Home Area Network (HAN), Neighborhood Area Network (NAN), Field Area Network (FAN), Wide Area Network (WAN), Wireless Sensor Networks (WSNs), IoT Protocols: Data Link Layer, Network Layer, and Application Layer.

Unit III – Sensors, Actuators and Controllers IoT Sensor Classifications: Based on Working Principle, Measured Physical Quantity, Signals Detected, and Applications. Actuator Classifications: Based on Type of Energy Used, Motion, Control Methods. IoT Controllers: Arduino:Nano, Uno, and Mega.

Unit IV – Cloud Computing and Data Analysis: Introduction to Cloud Computing, Definitions and Characteristics Concept of Cloud, Classifications of Cloud, Data Analytics: Data Collection, Data Cleaning and Pre-processing, Exploratory Data Analysis, Data Modelling, Interpretation of Data, and Implementation, Data Management Challenges.

Unit V – IoT Applications: Business Models for The Internet of Things, Smart City, Smart Mobility and Transport, Industrial IoT, Smart Health, Environment Monitoring and Surveillance, Home Automation, Smart Agriculture etc.

Course Outcomes:

After the completion of the course, the student will be able to –

CO 1. **Explain** the IoT fundamentals, architectural models, and associated design and security challenges
CO 2. **Analyze** IoT communication networks and protocols across different layers
CO 3. **Classify** sensors, actuators, and IoT controllers
CO 4. **Apply** cloud computing concepts and data analysis techniques within IoT systems
CO 5. **Explore** IoT applications in various domains

Reference/ Text Books:

1. ***Internet of Things: Principles and Paradigm*** *by Rajkumar Buyya and Amir Vahid Dastjerdi, Morgan Kaufmann, 2016.*
2. ***The Internet of Things: Key Applications and Protocols*** *by Olivier Hersent, David Boswarthick, and Omar Elloumi, Wiley, 2012.*
3. ***IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things*** *by David Hanes, Gonzalo Salgueiro, and Patrick Grossetete, Cisco Press, 2017.*
4. ***Internet of Things (A Hands-on-Approach)*** *by Arshdeep Bahga and Vijay Madisetti, VPT, 2014.*
5. ***Internet of Things: Architecture and Design Principles*** *by Raj Kamal, McGraw Hill Education, 2017.*

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	2	2	1	1	1	1	3	2	-
CO2	3	3	3	1	1	1	1	1	1	1	1	3	2	-
CO3	3	3	3	1	2	1	2	1	1	1	1	3	2	-
CO4	3	3	3	2	3	1	2	1	1	1	1	3	3	-
CO5	3	3	3	2	3	3	3	1	1	1	1	3	3	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

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Centre for Internet of Things

COMPUTER PROGRAMMING: 23241102

Course Objectives:

- To understand the fundamentals of C programming including keywords, data type, functions etc.
- To acquire the ability to write a computer program to solve specified problems.
- To familiar with program structure and debugging process.
- To implement basic programming solutions using array, pointer, structures and file handling.

Unit 1: Introduction to C Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution, Translation Process and compiler Installation, Problem solving using Algorithms and Flowcharts, Identifiers, Data Types, Constants, Keywords, Input/output Instruction, Operators and Expressions, Precedence of operators, ASCII codes.

Unit 2: Decision Control, if statement, if-else statement, Nested if else statements, if else ladder, The conditional expression, Switch statement, Loops, While loop, do-while loop, For loop, nesting of for loops, Break and continue statement.

Unit 3: Array, type of array, One dimensional Arrays, 2D array, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, type of pointers, Application of pointers, Pointer to Pointer, Pointer to Array, Array of Pointers, Pointer to Strings.

Unit 4: Function Basics, Function Prototypes, Call by value, call by reference, passing string and array to function, Function returning address, Recursion, Structures, Dynamic memory allocation by malloc/calloc function, Union, Enumerators, typedef in c.

Unit 5: File Handling, Defining and Opening a file, reading and writing in file, Closing Files, Input/output Operations on Files, Predefined Streams, Storage class, preprocessor commands, Command Line Arguments.

Recommended Books:

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

Course Outcomes:

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

CO1. **Define** basic programming terms, syntax, algorithm and flow chart.
CO2. **Solve** computational problems using decision control and loops.
CO3. **Design** a program using the concept of Array, pointer and functions.
CO4. **Explore** file handling operations to work efficiently with files.
CO5. **Apply** programming concept to implement, debug and test any C program.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	2	1	1	1	1	1	1	3	-	-
CO2	3	2	1	1	3	1	1	1	1	1	1	3	-	-
CO3	3	3	3	3	3	2	1	1	1	1	2	3	-	-
CO4	3	2	2	1	3	2	1	1	1	1	3	3	-	-
CO5	3	3	3	3	3	3	2	1	1	1	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

ENGINEERING MEASUREMENT: 23241103

Course Objectives: The course aims to enhance the students' proficiency in engineering measurement techniques, including the identification and correction of measurement errors.

UNIT - I: Fundamentals of Measurement: Measurement system& types, Characteristics of measurement, Errors in Measurement & their source, Types of errors, Systematic and random errors in measurement, Expression of uncertainty, Accuracy and Precision.

UNIT - II: Analog Measurements: Basic electrical parameters- Current, Voltage, Frequency, Power, Power factor, Energy, RMS value, Average value; Analog Measurements using- PMMC, Moving Iron, Single phase dynamometer Wattmeter, Extension of range in PMMC, Energy meters.

UNIT - III: Digital Measurements: Digital voltmeter, Digital multimeter, Fundamentals of DSO: Measurement of Voltage, Current, Phase, Time period& Frequency, Basics of ECG, EEG, EMG, ERG waveforms, Comparison of analog and digital measurements.

UNIT - IV: Measurement of Electrical component's properties: Electrical components and their properties-Resistance, Inductance Capacitance and Impedance; Measurement of Resistance, Introduction to AC bridges for inductance and capacitance measurement.

UNIT - V: Renewable Energy Measurement: Measurement of direct and diffuse solar irradiance using pyrheliometer and pyranometer, Wind speed and direction measurement by anemometer, Humidity measurement using hygrometer, luminance Measurement using Lux meter, Energy management using Smart meters.

Text& Reference Books:

1. *A K Sawhney, "**Electrical & Electronic Measurement & Instrument**", Dhanpat Rai &Sons.*
2. *BC Nakra& K. Chaudhary, "**Instrumentation, Measurement and Analysis,**" TMH 2nd Edition.*
3. *Purkait, "**Electrical & Electronics Measurement & Instrumentation**", TMH.*
4. *Robert B Northrop, "**Introduction to Instrumentation and Measurements.**" CRC Press, 2nd edition.*
5. *John Twidell and Tony Weir, "**Renewable Energy Resources,**" Routledge, Taylor & Francis.*

Course Outcomes:

After successful completion of course, the students will be able to-

CO1: **Explain** the types and characteristics of measurement systems, errors and remedies.
CO2: **Describe** basic electrical parameters and their analog measurement methods.
CO3: **Apply** digital measurement techniques to measure electrical and electronic parameters.
CO4: **Describe** measurement of electrical component properties with the help of bridges.
CO5: **Explain** basic renewable energy parameters and their measurement methods.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	2	1	1	1	1	1	1	3	-	-
CO2	3	2	1	1	3	1	1	1	1	1	1	3	-	-
CO3	3	3	3	3	3	2	1	1	1	1	2	3	-	-
CO4	3	2	2	1	3	2	1	1	1	1	3	3	-	-
CO5	3	3	3	3	3	3	2	1	1	1	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

DIGITAL ELECTRONICS AND LOGIC DESIGN: 23241104

Course Objectives:

- To familiarize the students with the number representation and conversion between various representations in digital electronic circuits.
- To expose the students to the logical operations using combinational logic circuits, sequential logic circuits and the characteristics of memory and their classification.

Unit I. Number System: Representation of Binary numbers, octal and hexadecimal numbers, complements, signed binary numbers, Binary codes, code conversion, floating-point numbers and arithmetic, and the conversion process. Subtraction using 1's and 2's complement, Excess 3, Gray code, Hamming Code.

Unit II. Boolean Algebra and Logic Gates: Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms- SOP & POS. Logical operations, truth tables, logic gates, logic levels, and pulse waveforms. Simplification of Boolean functions: The map method- the Karnaugh map, minimal SOP & POS, Don't care conditions, multiple output minimization, tabular method, determination, and selection of prime implicants.

Unit III. Combinational Logic Circuits: Introduction: Design Procedure, adder, subtractor, Magnitude Comparator, Universal Gate, Encoders, Decoders, Multiplexers, Demultiplexer, Parity Checker Generator.

Unit IV. Sequential Logic Circuits: State tables and diagrams, Flip Flop and its various types -S-R, J-K, D and T Flip Flops, Excitation table, Triggering of FFs & Latches. Registers: - Shift – Registers, Ripple Counters, Synchronous Counters. Ring Counters. Timing Sequences, design procedure.

Unit V: Memory and Programmable Logic Device: Introduction to Digital Logic families (RTL, DTL, TTL, ECL, CMOS & Schottky logic) and their special characteristics: Fan-Out, Fan In, power dissipation, the figure of merit, Noise Margin; Circuits of Logic Families, RAM, ROM, A/D And D/A converters and their types.

Recommended Books:

1. *Digital Design by **Morris Mano**, Pearson Education, 6th edition 2018*
2. *Logic Design Theory by **N.N. Biswas**,Prentice Hall India Learning Private Limited,1993*
3. *Digital Fundamental by **T.L. Floyd**, Pearson Education, 11th edition, 2017*

Course Outcomes:

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

- **CO 1.** **Perform** conversion among Different number systems and codes.
- **CO 2.** **Simplify** the logic expressions using Boolean laws, and map methods and design them by using logic gates.
- **CO 3.** **Design** a given digital combinational circuit using basic gates for different applications.
- **CO 4.** **Analyze** different types of flip-flops and design a sequential logic circuit
- **CO 5.** **Apply** the concepts the basics of Logic family to design digital circuits

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	2	1	1	1	1	1	1	3	-	-
CO2	3	2	1	1	3	1	1	1	1	1	1	3	-	-
CO3	3	3	3	3	3	2	1	1	1	1	2	3	-	-
CO4	3	2	2	1	3	2	1	1	1	1	3	3	-	-
CO5	3	3	3	3	3	3	2	1	1	1	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

LINEAR ALGEBRA & CALCULUS: 23241105

Course Objectives:

- To understand the concept Matrices and its applications
- To understand the various aspect of algebraic structures'
- To expose the concept of ordinary and partial differentiation
- Evaluation of improper integrals using Beta and Gamma functions.
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

Unit1: Matrix, Rank of Matrix, Echelon form, Normal form of matrix, Solution of simultaneous equation by elementary transformation, Consistency of equation, Eigen values and Eigenvectors, Normalized eigenvector, Cayley Hamilton theorem and its application to finding inverse of matrix.

Unit2: Introduction to Groups and Field, Vector spaces over the field, linear dependent vectors and linear independent vectors, linear combination of vectors, linear span of a set of vectors, basis and dimension of a vector space.

Unit 3: Differential Calculus –I : nth Derivative ,Leibnitz's theorem, Partial derivatives, Euler's theorem for homogeneous functions, Total derivatives, Change of variables.

Unit 4: Differential calculus-II : Taylor's and Maclaurin's Theorems, Expansion of function of several variables, Jacobian, properties of Jacobian, Approximation of errors, Extrema of functions of several variables (Maxima and Minima of function of one and two variables), Lagrange's method of multipliers (Simple applications).

Unit 5: Integral Calculus Beta and Gamma function and its properties, transformation of Beta function, Gama functions, transformation of Gama function, relation between Beta and Gama function, Double and triple integrals, Change of order of integration, Application of Integration to Volumes and Surface areas.

Course Outcomes

After completing this course, student will be able to:

CO1	Application of various matrix in engineering problems
CO2	Analytical Solution of Algebraic Structures
CO3	Use of Differential Calculus
CO4	Apply Differential Calculus in basic Engineering Problems
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Recommended Books:

1. E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
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Centre for Internet of Things

UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS: 23241111

Course Objectives:

The objective of the course is fourfold:

1. Sensitization of students towards self, family (relationship), society, and nature.
2. Understanding (or developing clarity) of nature, society, and larger systems, on the basis of human relationships and resolved individuals.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Content:

1: Course Introduction - Need, Basic Guidelines, Content, and Process for Value Education:

- Self-Exploration – what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation as the process for self-exploration.
- Continuous Happiness and Prosperity - A look at basic Human Aspirations.
- Right understanding, Relationship, and Physical Facility - The basic requirements for the fulfillment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario.

2: Understanding Harmony in the Human Being:

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
- Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer).
- Understanding the characteristics and activities of 'I' and harmony in 'I'.
- Understanding the harmony of 'I' with the Body.

3: Understanding Harmony in the Family and Society - Harmony in Human-Human Relationship:

- Understanding values in human-human relationships; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of the relationship.
- Understanding the meaning of Trust; Difference between intention and competence.
- Understanding the meaning of Respect; Difference between respect and differentiation; the other salient values in the relationship.
- Understanding the harmony in society (society being an extension of family): Resolution, Prosperity, Fearlessness (trust), and Co-existence as comprehensive Human Goals.
- Visualizing a universal harmonious order in society.

4: Understanding Harmony in Nature and Existence - Existence as Coexistence:

- Understanding the harmony in Nature.
- Interconnectedness and mutual fulfillment among the four orders of nature; recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space.
- Holistic perception of harmony at all levels of existence.

5: Holistic Understanding of Harmony on Professional Ethics:

- Natural acceptance of human values.
- Definitiveness of Ethical Human Conduct.
- Basis for Humanistic Education, Humanistic Constitution, and Humanistic Universal Order.
- Competence in professional ethics:
  a. Ability to utilize the professional competence for augmenting universal human order.

b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.
c. Ability to identify and develop appropriate technologies and management patterns for the above production systems.

- Strategy for transition from the present state to Universal Human Order:
  a. At the level of individual: as socially and ecologically responsible engineers, technologists, and managers.
  b. At the level of society: as mutually enriching institutions and organizations.

Gender Sensitization:

- Introduction to Sex, Gender & Culture.
- Introduction to Women Studies and Socialization, including man-woman relationship, work distribution.
- A brief review of Feminism, Patriarchy, Feminist Studies, Feminist Ideologies.
- Women and Law: Constitutional Provisions and Fundamental Rights related to Women.

Course Outcomes:

At the end of the course, the student will be able to:

- **CO1.** Become more aware of their surroundings, society, social problems, and their sustainable solutions.
- **CO2.** Become sensitive to their commitment towards what they believe in (humane values, humane relationships, and humane society).
- **CO3.** Apply what they have learned to their own self in different day-to-day settings in real life.
- **CO4.** Sustain human relationships and human nature in mind.
- **CO5.** Have better critical ability.
- **CO6.** Negotiate living in harmony with self and others.

Text Book:

1. *Human Values and Professional Ethics* by R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010.

Reference Books:

1. *Jeevan Vidya: Ek Parichaya* by A. Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. *Human Values* by A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* by Mohandas Karamchand Gandhi.
5. *On Education* - J. Krishnamurthy.
6. *Siddhartha* by Hermann Hesse.
7. *Old Path White Clouds* by Thich Nhat Hanh.
8. *On Education* - The Mother.
9. *Diaries of Anne Frank* by Anne Frank.
10. *Life and Philosophy of Swami Vivekananda*.
11. *Swami Vivekananda on Himself*.
12. *Small is Beautiful* by E.F. Schumacher.
13. *Slow is Beautiful* by Cecile Andrews.
14. *Economy of Permanence* by J.C. Kumarappa.

Real-Time Control and Simulation Lab: 22100003

Course Objective:

- To model, simulate, and analyze the performance of conventional and reduced device multilevel inverters using real-time OPAL-RT simulation.
- To investigate power quality issues, such as harmonics and voltage sags, in single-phase and three-phase systems using real-time analysis.

LIST OF EXPERIMENTS

1. Develop and Simulate Conventional Single-Phase Multilevel Inverter
2. Implement Simulation for Conventional Three-Phase Multilevel Inverter
3. Create and Analyze Reduced Device Count Multilevel Inverter Using Simulation
4. Examine Single-Phase Grid-Connected Inverter with Renewable Energy
5. Investigate Performance of Three-Phase Grid-Connected Inverter for Renewable Systems
6. Design and Simulate Single-Phase PLL for Grid Synchronization
7. Test Synchronization of Three-Phase PLL with Grid Disturbances
8. Analyze Harmonic Distortion and Voltage Sag/Swell/DC offset in Single-Phase Systems
9. Evaluate Harmonic Distortion and Voltage Sag in Three-Phase
10. Control of inverter in Grid-Connected Renewable Systems Under Faults through Real-Time Experimentation

COURSE OUTCOMES:

After the completion of the course, the student will be able to –

CO1	**Analyze** the multilevel inverter topologies using real-time OPAL-RT
CO2	**Apply** knowledge of inverter control techniques to improve power quality in grid-connected systems
CO3	**Implement** real-time simulations for power quality analysis and harmonic distortion measurement
CO4	**Prepare** and maintain an organized practical file documenting real-time simulation experiments and results

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	2	1	1	1	3	3	-	2
CO2	3	3	3	3	3	2	2	2	1	1	3	3	-	2
CO3	3	3	3	3	3	3	1	1	1	1	3	3	-	2
CO4	-	1	1	-	1	-	2	3	3	3	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

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Centre for Internet of Things

Soft Computing Techniques Lab (22100011)

Course Objective:

This course is designed to provide students with a comprehensive understanding of advanced concepts in fuzzy logic, neural networks, and optimization techniques, with applications in power systems, forecasting, and fault detection

LIST OF EXPERIMENTS

1. To Perform Union, Intersection, and Complement Operations.
2. To Implement De-Morgan's Law.
3. To Plot Various Membership Functions.
4. To Perform Fuzzy Set Operations.
5. To Implement Fuzzy Inference System.
6. To Model Tip Value for the Waiter Based on Quality and Service of Food Using Fuzzy Toolbox.
7. To Design a Fuzzy Logic Controller to Determine the Wash-Time of a Domestic Washing Machine Using Two Inputs, i.e., Dirt and Grease.
8. To Generate AND, NOT Function Using McCulloch-Pitts Neural Network.
9. To Generate XOR Function Using Backpropagation Algorithm.
10. Implementation of Particle Swarm Optimization Algorithm to Find Optimal Solution.
11. Multilayer Perceptron and Application (through Virtual Lab).
12. Fuzzy Control and Application (through Virtual Lab).Optimal solution for economic load dispatch problem in power system using Genetic algorithm (GA).
13. Solar power generation forecasting using Artificial neural network and fuzzy logic-based model
14. Wind power generation forecasting using Artificial neural network and fuzzy logic-based model
15. Fault detection and classification in power distribution network using Artificial neural network and Particle swarm optimization.

Course Outcomes:

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

- **CO 1.** **Illustrate** the various mathematical and logical operations involved in soft computing techniques.
- **CO 2.** **Implement** the concepts of fuzzy logic comprising fuzzy sets, knowledge representation using fuzzy rules, and fuzzy inference systems, to design intelligent systems.
- **CO 3.** **Formulate** objective function and determine optimal solution using evolutionary optimization techniques.
- **CO 4.** **Prepare** an organized technical report on experimentsconducted in the laboratory.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	1	1	1	1	1	1	3	-	2
CO2	3	3	3	1	1	1	1	1	1	1	1	3	-	2
CO3	3	3	3	1	1	1	1	1	1	1	1	3	-	2
CO4	-	1	1	1	1	1	2	3	3	3	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Advanced IoT Lab (22100007)

Course Objective:

- *To understand the advance application and vision of IoT from a global context.*
- *Make the students to apply IoT data for advance applications in various domainin secured manner*

LIST OF EXPERIMENTS

1. Analyze the connectivity protocols (such as Wi-Fi, Bluetooth, Zigbee) used in IoT devices and compare their advantages and disadvantages.
2. Implement and compare different calibration techniques for sensors used in IoT systems to ensure accuracy and reliability of data.
3. Design and implement a smart energy monitoring system using IoT devices to monitor and optimize energy consumption.
4. Develop an IoT-based smart irrigation system that monitors soil moisture levels and controls water flow to optimize irrigation in agriculture.
5. Deploy air quality sensors in various locations to collect real-time data and analyze the air quality using IoT techniques.
6. Design and prototype an IoT-based healthcare monitoring system that collects vital signs data from patients and sends alerts in case of abnormalities.
7. Analyze data collected from IoT sensors in agriculture to derive insights for optimizing crop management practices and increasing yield.
8. Evaluate the security vulnerabilities in IoT communication networks and implement countermeasures to enhance data privacy and integrity.
9. Integrate IoT devices with cloud platforms such as AWS IoT or Azure IoT to enable remote monitoring, data storage, and analytics.
10. Optimize the power consumption of IoT devices by implementing techniques such as duty cycling, sleep modes, and energy-efficient communication protocols.

Course Outcomes:

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

CO1: Explain the application and usages of the internet of things in different contexts.
CO2: Describe the key components and applications of IoTin Smart Grid.
CO3: Explain and implementation of IoT application for value creations.
CO4: Design IoT architecture used to monitor the air quality.
CO5: Implement IoT architecture for healthcare system.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	3	2	2	1	1	1	3	2	-	2
CO2	2	1	2	1	3	2	2	2	1	1	2	3	-	2
CO3	1	1	1	1	3	3	1	1	1	1	3	3	-	2
CO4	-	1	1	3	2	2	2	3	3	3	3	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

ITEM-3

To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses and Micro Project-I to be offered in B.Tech. I semester along with their COs.

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Centre for Internet of Things

COMPUTER PROGRAMMING LAB: : 22241106

Laboratory Objectives:

- To Develop a knowledge of Computer Programming
- To Enhance Practical programming Skills to solve real world problems.

LIST OF EXPERIMENTS

1. Write a program to add two numbers and display its sum.
2. Write a Program to calculate and display the volume of a cylinder for height and radius parameters to be input from the user.
3. Write a program to take input of name, roll number and marks obtained by a student in 5 subjects of 100 marks each and display the name, roll number with percentage score secured.
4. Write a program to swap values of two variables with and without using the third variable.
5. Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.
6. Write a program to find the largest of three numbers using ternary operators.
7. Write a program to find the roots of quadratic equation.
8. Write a Program to Check Whether a Number is Prime or not.
9. Write a program to compute the grade of students using if else ladder as per MITS norms.
10. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)
11. Write a program to print the sum of digits of a number using for loop.
12. Write a program to Display Fibonacci Sequence.
13. Write a program to display different kind of pyramid patterns using for loops.
14. Write a program to add two matrices of the same order.
15. Write a program to show the working of predefine functions in string.
16. Write a program to illustrate concept of function and different type of functions.
17. Write a program to find factorial of a number using recursion.
18. Write a program to find sum of natural numbers using recursion.
19. Write a program to illustrate concept of structure and union in c programming.
20. Write a program to show concept of file handling.

Course Outcomes:

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

- **CO 1.** **Write** computer program in C language.
- **CO 2.** **Apply** knowledge of programming to solve real-world problems
- **CO 3.** **Apply** programming syntax to implement program.
- **CO 4.** **Acquire** teamwork skill for working effectively in groups
- **CO 5.** **Prepare** an organized practical file on experiments conducted in the laboratory.

INTERNET OF THINGS LAB: 22241107

Laboratory Objectives:

- To familiarize students with the Arduino hardware and software environment, including the installation and setup of the Arduino IDE.
- To develop foundational programming skills for interfacing with basic sensors and actuators, enabling the control and monitoring of various electronic components.

LIST OF EXPERIMENTS

1. Introduction to Arduino Board and Arduino IDE (Installation and Setup)
2. Write a Program to Blink LED (Turn an LED on and off).
3. Write a Program to demonstrate the use of analog output to fade an LED.
4. Write a Program to read an analog input and prints the voltage to the serial monitor.
5. Write a Program to count the number of button pushes.
6. Write a Program to Control an LED using Button.
7. Write a program to detect and measure the distance of an object using Ultrasonic sensor.
8. Write a program to detect fire using flame 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 and measure the light intensity using LDR Sensor.
13. Write a Program to play melody with a Piezo speaker.
14. Write a Program to display number from 0-9 using 7-segment display.
15. Write a Program to control the servo motor.

Course Outcomes:

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

- **CO 1.** **Analyze** sensor data factors and sensor limitations on measurement accuracy
- **CO 2.** **Apply** knowledge of sensors and measurement systems to solve real-world problems
- **CO 3.** **Acquire** teamwork skill for working effectively in groups
- **CO 4.** **Prepare** an organized practical file on experiments conducted in the laboratory.

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Centre for Internet of Things

MICRO PROJECT-I : : 22241109

Domain : Basic Arduino /Digital Electronics/Internet of Things

1. Develop a calculator that performs addition, subtraction, multiplication, and division of binary numbers, including the use of 1's and 2's complements for subtraction.
2. Design circuits that demonstrate the working of Analog-to-Digital (A/D) and Digital-to-Analog (D/A) converters, with real-time signal conversion.
3. Create a project comparing the operation of synchronous and asynchronous counters, illustrating the differences in timing and speed.
4. Develop a ring counter circuit that uses flip-flops and demonstrates timing sequences through LED indicators.
5. Design a digital counter using different types of flip-flops (JK, D, T) that can count up, count down, or both, with a display of the current count.
6. Develop a priority encoder circuit that encodes the highest priority input that is active, with multiple active inputs.
7. Create a simple calculator using multiplexers to select different arithmetic operations (addition, subtraction, etc.) based on input signals.
8. Build a 4-bit magnitude comparator circuit that compares two binary numbers and outputs whether one is greater than, less than, or equal to the other.
9. Design a combinational circuit that can perform both addition and subtraction on 4-bit binary numbers.
10. Implement a circuit that simplifies and minimizes multiple Boolean functions simultaneously using the tabular method.
11. Create a digital lock system using Boolean algebra, where the correct combination of inputs (like a code) unlocks the system.
12. Create a project that generates Hamming code for error detection and correction and demonstrates how it corrects single-bit errors.
13. Develop a system that controls various electronic appliances (e.g., lights, fans, and heaters) using a Relay Shield and Arduino.
14. Build a weather station that continuously monitors and displays temperature and humidity levels
15. Create a security system that detects motion using a PIR sensor and triggers an alarm or notification.
16. Design a lighting system that automatically turns lights on or off depending on the ambient light intensity
17. Develop a system that controls home appliances based on environmental conditions and occupancy using multiple sensors (Relay Shield, DHT11, PIR, and LDR)
18. Create a doorbell system that detects visitor presence using a PIR sensor and sends alerts or records footage.

LANGUAGE LAB: 22241110

Course Objectives:

- The course intends to build the required communication skills of the students to communicate effectively in real-life situations like starting a talk and be comfortable using the English language.
- It aims at teaching students to appreciate the English language through the study of scientific, creative, and academic text.
- The course is designed to acquaint students with the structure of the English language used in literature, functional varieties, figurative language, and verbal concomitance.
- The students are expected to enrich their knowledge of language, culture, and ethics through this course.

Unit I: Communication: Approaches, Elements, Verbal and Nonverbal Communication; Barriers to Communication; Johari Communication Window.

Unit II: Listening Factors Affecting Listening and Improving Listening.

Unit III: Speaking Public Speaking & Delivering Presentations.

Unit IV: Reading Passages & Comprehension: Steps and Methods.

Unit V: Writing Essentials of Good Writing; Drafting CV/Biodata/Résumé.

Course Outcomes:

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

- **CO1** Speak clearly, effectively, and appropriately in a public forum to a variety of audiences and purposes.
- **CO2** Prepare oral dialogues and arguments within the Engineering Profession effectively.
- **CO3** Demonstrate knowledge and comprehension of major texts and traditions in language as well as its social, cultural, and historical context.
- **CO4** Read a variety of texts analytically to demonstrate in writing and/or speech the interpretation of texts.
- **CO5** Interpret text written in English, assessing the results in written and oral arguments using appropriate material for support.

Reference Books:

- *Understanding Human Communication* — By Ronald Alderman, OUP
- *Communication Skills for Engineers* — Pearson Education
- *Practical English Grammar* by Thomson & Martinet — Oxford University Press
- *A Handbook of Language Laboratory* by P. Sreekumar — Cambridge University Press

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ITEM-3

To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses and Micro Project-I to be offered in B.Tech. I semester along with their COs.

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

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Centre for Internet of Things

COMPUTER PROGRAMMING LAB: : 23241106

Laboratory Objectives:

- To Develop a knowledge of Computer Programming
- To Enhance Practical programming Skills to solve real world problems.

LIST OF EXPERIMENTS

1. Write a program to add two numbers and display its sum.
2. Write a Program to calculate and display the volume of a cylinder for height and radius parameters to be input from the user.
3. Write a program to take input of name, roll number and marks obtained by a student in 5 subjects of 100 marks each and display the name, roll number with percentage score secured.
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18. Write a program to find sum of natural numbers using recursion.
19. Write a program to illustrate concept of structure and union in c programming.
20. Write a program to show concept of file handling.

Course Outcomes:

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

- **CO 1.** **Write** computer program in C language.
- **CO 2.** **Apply** knowledge of programming to solve real-world problems
- **CO 3.** **Apply** programming syntax to implement program.
- **CO 4.** **Acquire** teamwork skill for working effectively in groups
- **CO 5.** **Prepare** an organized practical file on experiments conducted in the laboratory.

INTERNET OF THINGS LAB: 23241107

Laboratory Objectives:

- To familiarize students with the Arduino hardware and software environment, including the installation and setup of the Arduino IDE.
- To develop foundational programming skills for interfacing with basic sensors and actuators, enabling the control and monitoring of various electronic components.

LIST OF EXPERIMENTS

1. Introduction to Arduino Board and Arduino IDE (Installation and Setup)
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15. Write a Program to control the servo motor.

Course Outcomes:

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

- **CO 1.** **Analyze** sensor data factors and sensor limitations on measurement accuracy
- **CO 2.** **Apply** knowledge of sensors and measurement systems to solve real-world problems
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Centre for Internet of Things

MICRO PROJECT-I : : 23241109

Domain : Basic Arduino /Digital Electronics/Internet of Things

1. Develop a calculator that performs addition, subtraction, multiplication, and division of binary numbers, including the use of 1's and 2's complements for subtraction.
2. Design circuits that demonstrate the working of Analog-to-Digital (A/D) and Digital-to-Analog (D/A) converters, with real-time signal conversion.
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Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

LANGUAGE LAB: 23241110

Course Objectives:

- The course intends to build the required communication skills of the students to communicate effectively in real-life situations like starting a talk and be comfortable using the English language.
- It aims at teaching students to appreciate the English language through the study of scientific, creative, and academic text.
- The course is designed to acquaint students with the structure of the English language used in literature, functional varieties, figurative language, and verbal concomitance.
- The students are expected to enrich their knowledge of language, culture, and ethics through this course.

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Unit V: Writing Essentials of Good Writing; Drafting CV/Biodata/Résumé.

Course Outcomes:

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

- **CO1** Speak clearly, effectively, and appropriately in a public forum to a variety of audiences and purposes.
- **CO2** Prepare oral dialogues and arguments within the Engineering Profession effectively.
- **CO3** Demonstrate knowledge and comprehension of major texts and traditions in language as well as its social, cultural, and historical context.
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- *A Handbook of Language Laboratory* by P. Sreekumar — Cambridge University Press

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

ITEM-6

To review and finalize the scheme structure for the Batch admitted in 2024-25 academic session syllabi of I Research Methodology and Ethics Ph.D. Programme under the Madhav Institute of Technology & Science-Deemed University (MITS-DU)

Recommended in BoS meeting of Centre for IoT held on 07.Sep.2024 *Admitted Batch 2024-25*

RESEARCH METHODOLOGY AND ETHICS:22100001

Course Objective:

- To distinguish between the scientific method and general knowledge while laying the foundation for research.
- To identify and apply appropriate research methodology in order to plan, conduct, and evaluate basic research.
- To explore the statistical methods and tools in research.
- To understand the philosophy of research and ethics, research integrity, and publication ethics
- To understand indexing and citation databases, open access publication, research metrics.

Introduction to Research Methodology: Meaning of Research, Objectives of Research, Motivations in Research, types of Research, Research Approaches. Significance of Research, Research Methods v/s Methodology, Scientific Methods, Research Process, Criteria of Good Research. Define the Research Problem: Concept and need of Research problem, Identification of Research problem, defining and delimiting Research problem.

Research Design: Problem Definition, variables, research design concepts. Literature survey and review, Research design process, Errors in research. Data Collection and Representation: Primary Data Secondary Data, Data Presentation. Processing and Analysis of Data.

Data Collection: Collections of Primary Data, Collection of Data through questionnaire and Schedules, other Observation Interview Methods, Collection of Secondary Data, Selection of appropriate method for data collection, Case Study, Focus Group Discussion, Techniques of developing research tools, viz. Questionnaire and rating scales etc. Reliability and validity of Research tools,

Descriptive Statistics: Measurement Scales, Sources of error in measurement, Measures of central Tendency (Mean, Medium, Modes), Measures of dispersion (Range, Mean Deviation, Standard Deviation), Moments, Moments Generating Function, Graphical representation of Data, Measures of Asymmetry (Skewness), Kurtosis, Correlation and Regression, and Curve fitting.

Sampling Methods and Distributions: Sampling Methods, Sampling Distribution of mean, Sampling Distributions of Variance. Testing of Hypotheses-1: Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Type I and Type II errors. Important Parametric Tests, Limitations of the Tests of Hypothesis, Chi-square Test, Non-Parametric Tests. Analysis of Variance components (ANOVA) for fixed effect model: Total, treatment and error of squares. Degrees of freedom, Confidence interval, some special distribution.

Report Writing: Pre writing considerations. Thesis writing, Formats of report writing, Formats of publications in Research journals. Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing. Different Steps in Writing Report, Layout of the Research Report,

Types of Reports, Report Format, Typing Instructions, Oral Presentation Literature review software.

Philosophy and Theory of Ethics: Nature, scope and Meaning of Ethics. Role of judgment in ethics, Ethics with respect to science and research-Intellectual honesty and research integrity-Scientific, Conduct and Plagiarism. Redundant Publications: duplicate and overlapping publications. Publication ethics: definition introduction and Importance-Best practices/standards setting initiatives and guidelines. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types Violation of publication ethics, authorship and contributor ship-Identification of publication misconduct, complaints and appeals, Vanity Publications,

Reference Books:

1. *C.R. Kothari: Research Methodology Methods and Techniques (Second Revised Edition), New Age. International Publication.*
2. *R. Panneerselvam, Research Methodology, PHI.*
3. *Ranjit Kumar, Research Methodology: a step-by-step guide for beginners, SAGE Publication Ltd.*
4. *Douglas C.Montgomery, Design and Analysis of Experiments, Wiley India, Fifth edition.*
5. *Douglas C. Montgomery and George C Runger: Applied Statistics & Probability for Engineers (Wiley India), Third edition.*
6. *K N Krishnaswamy, Appalyer Sivakumar and M Mathirattan: Research Methodology: Integration of Principles, Methods and Techniques (Pearson Education, New Delhi).*

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