Fundamental of Deep Learning using NVIDIA Nano Jetson GPU

Short Term Course Contents

S.No.	Day/Date	Content	Theory/ Practical	Hours
1	17-07-2023	Introduction of Deep Learning	Theory	3
2	18-07-2023	Applications of Deep Learning	Theory	3
3	19-07-2023	Know your NVIDIA Nano Jetson GPU	Theory	3
4	20-07-2023	NVIDIA Nano Jetson GPU installation part-1	Practical	3
5	21-07-2023	NVIDIA Nano Jetson GPU installation-2	Practical	3
6	22-07-2023	Testing and signalling of NVDIA Jetson Hardware, Start working with Terminal	Practical	3
		Getting Started with AI on Jetson Nano		
7	24-07-2023	Introduction	Theory	3
8	25-07-2023	Set up your Jetson Nano and camera	Practical	3
9	26-07-2023	Collect image data for classification models	Practical	3
10	27-07-2023	Annotate image data for regression models	Practical	3
11	28-07-2023	Train a neural network on your data to create your own models	Practical	3
12	29-07-2023	Run inference on the Jetson Nano with the models you create	Practical	3
Assignment-1 **Create your own deep learning classification and regression models with the Jetson Nano**				
		Building Video AI Applications at the Edge on Jetson Nano		
13	31-07-2023	Set up your Jetson Nano: Introduction	Theory	3
14	01-08-2023	Build end-to-end Deep Stream pipelines to convert raw video input into insightful annotated video output	Practical	3
15	02-08-2023	Build alternate input and output sources into your pipeline	Practical	3
16	03-08-2023	Configure multiple video streams simultaneously	Practical	3
17	04-08-2023	Know alternate inference engines such as YOLO	Theory	3
18	05-08-2023	Deep Stream applications that annotate video streams from various and multiple sources to identify and classify objects	Theory	3
Assignment 2: Build Deep Stream applications that annotate video streams				
19	07-08-2023	NVIDIA online certification Details and enrolment	Theory	3
20	08-08-2023	Project Assessment	Practical	3

Theory=24 Hrs., Practical=36 Hrs.

Dr. Pankaj K Goswami
Vice-Principal, Faculty of Engineering

TMU Faculty Dr.Vipin Kumar <drvipink.engineering@tmu.ac.in>

Regarding BoS of Electronics & Communication Engineering Department

2 messages

HoD EC <hodec@tmu.ac.in> Tue, Jul 11, 2023 at 3:11 PM

To: dralka.engineering@tmu.ac.in, Rahul Sharma <drrahul.engineering@tmu.ac.in>, Tmu Kaushik <neeraja.engineering@tmu.ac.in>, TMU Faculty Mr Rahul Vishnoi <rahulv.engineering@tmu.ac.in>, TMU Faculty Prashant <prashant.engineering@tmu.ac.in>

Cc: TMU Principal College of Computing Sciences and Information Technology <principal.computers@tmu.ac.in>, drvipink.engineering@tmu.ac.in

Dear Sir/Mam,

In reference to the attached BoS approval, the department of Electronics & Communication Engineering is going to conduct its BoS meeting at 11:00 AM on 12.07.2023 in the Director office, FoE.

The following agenda points will be discussed during the meeting.

1. No change is required in the contents of B.Tech. (ECE) with specialization in IoT and B.Tech Computer & Communication Engineering syllabus for academic session 2023-24.
2. Specialization in Diploma Electronics courses has been added as:

A. Data Sciences
B. Mobile Technology
C. Robotics & Automation

3. Short term, value added course "A Short Term course on Fundamental of Deep Learning using NVIDIA Nano Jetson GPU from 17 July- 08 August, 2023" is proposed.
4. Any other suggestions by the external expert.

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Google site: https://sites.google.com/tmu.ac.in/dr-pankaj-kumar-goswami/home?authuser=0
image.png https://www.youtube.com/channel/UC...
Google Scholar: https://scholar.google.co.in/citations?user=...&hl=en
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Dr. Vipin Kumar <drvipink.engineering@tmu.ac.in> Tue, Jul 11, 2023 at 3:35 PM

To: TMU Staff Nikhil Saxena <nikhil.computer@tmu.ac.in>

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Teerthanker Mahaveer University, Moradabad
Faculty of Engineering
Department of Electronics and Communication Engineering,
Minutes of Meeting- "Board of Study"
Dated: 12 July, 2023

A meeting of Board of Studies has been held in Principal's office, Faculty of Engineering on 12/07/2023. Following points have been discussed and following members were present in meeting:

1. Dr Pankaj Kumar Goswami, HoD, ECE Department (Chairperson)
2. Dr Sanjay Mathur, Professor & Head, ECE, GB Pant University of Ag & Technology, University (External Expert)
3. Dr Alka Verma, Associate Professor, ECE Department
4. Dr Rahul Sharma, Assistant Professor, ECE Department
5. Mr. Rahul Vishnoi, Assistant professor, ECE Department (Member)
6. Mr. Neeraj Kaushik, Assistant professor, ECE Department (Member)
7. Mr. Prashant Kumar, Assistant professor, ECE Department (Member)

The following points were discussed in BoS:

1. Department of Electronics and Communication Engineering proposed for no change in existing syllabus of B.Tech.- Electronics and Communication Engineering, B.Tech Computer and Communication Engineering and M.Tech Machine Learning & Data Sciences for session 2023-24. **(Annexure 1, 2 & 3).**

2. Diploma in Electronics Engineering proposed three minor specializations from academic session 2023-24;
   1. **Diploma in Electronics with minor specialization in Data Sciences**
   2. **Diploma in Electronics with minor specialization in Mobile Technology**
   3. **Diploma in Electronics with minor specialization in Robotics & Automation**

   The members recommended all the three minor specialization in Diploma Electronics with few suggestions related to more specific content with respect to specific minor specializations, in course contents. ***The suggestions have been incorporated. (Annexure 4,5 & 6)***

3. Short-term, value-added course on **"Fundamental of Deep Learning using NVIDIA Nano Jetson GPU"** was proposed by ECE Department for summer internship for summer internship July-August 2023. The members recommended and suggested to include such value added courses in extracurricular activity & ability enhancement. **(Annexure 7)**
   The suggestions have been incorporated

The meeting was ended with vote of thanks.

Dr Pankaj Kumar Goswami
HoD & BOS Chairperson, ECE Department

तीर्थंकर महावीर विश्वविद्यालय
Teerthanker Mahaveer University

Faculty of Engineering
Attendance Sheet for BoS

Date: 12.07.2023

Department of Electronics & Communication Engineering
Attendance Sheet

S. No.	External Expert/Chairperson/Faculty	Designation	Signature
1	Prof. Sanjay Mathur	Professor, G.B. Pant University of Ag & Technology, Pantnagar,	
2.	Dr Pankaj Kumar Goswami	HoD, ECE Department	
3.	Dr Alka Verma	Associate Professor, ECE Department	
4.	Dr Rahul Sharma	Assistant Professor, ECE Department	
5.	Mr Rahul Vishnoi	Assistant Professor, ECE Department	
6.	Mr Neeraj Kaushik	Assistant Professor, ECE Department	
7	Mr. Prashant Kumar	Assistant Professor, ECE Department	
8	Prof. S.P. Pandey	External Member, Professor, Department of Physics	

Dr Pankaj Kumar Goswami
BoS, Chairperson
Department of Electronics & Communication Engineering

Study & Evaluation Scheme

Of

Bachelor of Technology
(Computer & Communication Engineering)

[Applicable w.e.f. Academic Session - 2023-24]

[As per CBCS guidelines given by AICTE]

Accredited with NAAC A Grade

12-B Status from UGC

TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in

Study & Evaluation Scheme	
SUMMARY	
Institute Name	*Faculty of Engineering*
Programme	*B.Tech. (Computer and Communication Engineering)*
Duration	*Four-year full time (Eight Semesters)*
Medium	*English/Hindi (NEP-2020)*
Minimum Required Attendance	*75%*
Credits	
Maximum Credits	*184*
Minimum Credits Required for Degree	*180*

Assessment:

			Internal	External	Total
Evaluation			40	60	100
Theory			50	50	100
Practical/ Dissertations/ Project Reports/ Viva-Voce					
Class Test-1	**Class Test-2**	**Class Test-3**	**Assignment(s)**	**Attendance & Participation**	**Total**
Best two out of three					
10	10	10	10	10	40
Duration of Examination			**External**	**Internal**	
			3 Hours	1.5 Hours	

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation (i.e. both internal and external).A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

 # Provision for delivery of 25% content through online mode.

Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.

Maximum no of years required to complete the program: N+2 (N=No of years for program)

Question Paper Structure	
1	*The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.*
2	*Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.*
3	*The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.*

IMPORTANT NOTES:	
1	*The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to of attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyse, Evaluate & Create (reference to Bloom's Taxonomy).*
2	*Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.*
3	*There shall be continuous evaluation of the student and there will be a provision of fortnight progress report.*

Program Structure-B.Tech.(Computer& Communication Engineering)

A. Introduction:

Computer & Communication Engineering is an ever-growing industry in today's digital scenario. It is the utilization of science and math applied to practical problems in the field of Computer & Communication. Computer & Communication Engineering in research, design, development and testing of the electronic equipment used in various communications systems. It is due to Computer engineers that we enjoy such modern communication devices as cellular telephones, radios and television. B.Tech. CCE offers a blend of computer science, data communication, and cutting-edge technologies such as Machine Learning, Deep Learning, Internet of Things (IoT), and Blockchain. Its' objective is to provide students with intricate knowledge of the basics of computer science, programming in languages such as C, Java, and Python; database design, web programming, and web development. The Program aims at providing the skillset on advanced technologies such as Artificial Intelligence, Internet of Things, and Blockchain. The program provides flexibility to obtain specialization in various domains such as Machine Learning, IoT, Cyber Security, Cloud Computing, Web Technologies, Computer Vision, Data Science, etc.

Students will develop and gain various skills that are transferable within the engineering world and practical skills that are equally useful in plenty of other sectors. Problem-solving skills are honed, and their interpersonal and communication skills will also improve with the amount of team work that they will be required to do. Students will also learn how to better manage their time and resources and assess the risks involved in a certain project. Other useful skills that they will learn include design, leadership and organisational skills.

The institute emphasis on the following courses ***balanced with core and elective courses:*** The curriculum of B.Tech. program emphasizes an intensive, flexible engineering education with 133 credits of core courses (all types), 35 credits of electives and 12 credits of field/internship projects. Total 184 credits are allotted for the B.Tech. degree.

The programme structure and credits for B.Tech. are finalized based on the stakeholders' requirements and general structure of the programme. Minimum number of class-room contact teaching credits for the B.Tech. program will be 158 credits (one credit equals 1.0 hour) and Project/internship will be of 26 credits. However, the minimum number of the credits for award of B.Tech.degree will be 180 credits. Out of 158 credits of classroom contact teaching, 67 credits are to be allotted for core courses (CC), 16 credits are allotted to Basic Science Courses (BSC), 11 credits are allotted to Engineering Science Courses (ESC), 07 credits are allotted to Mandatory Courses (AECC), 06 credits are allotted to open elective courses (OEC), 24 credits are allotted to Professional Elective courses and rest of 21credits for Laboratory courses. Credits distribution is given below in tabular form:

Summary

Courses Type	Number of Courses
Applied Science (BSC)	04
Engineering Sciences (ESC)	03
Ability Enhancement Course (AECC)	03
Core Computer Engineering (PCC)	11
Core Communication Engineering (PCC)	08
Program Elective (PEC)	06
Open Elective (OE)	02
Skill Enhancement Course (SEC)	06
Lab Courses	19
Project Courses	05
Total	T: 43 P: 24

B.Tech. -Computer & Communication Engineering: Four-Year (8-Semester) CBCS Programme			
Basic Structure: Distribution of Courses			
S.No.	**Type of Course**	**Credit Hours**	**Total Credits**
1	BSC - Basic Science Courses	4 Courses of 4 Credits each (Total Credit Hrs. 4X4)	16
2	ESC - Engineering Science Courses	2 Courses of 4 Credits each (Total Credit Hrs. 2X4) 1 Courses of 3 Credits each (Total Credit Hrs. 1X3)	11
3	AECC–Ability Enhancement courses	1 Courses of 3 Credits each (Total Credit Hrs. 1X3) 2 Courses of 2 Credits each (Total Credit Hrs. 2X2)	07
4	PCC - Professional core courses	10 Courses of 4Credits each (Total Credit Hrs. 10X4) 9 Courses of 3Credits each (Total Credit Hrs. 9X3)	67
5	PEC - Professional Elective courses	6 Courses of 4 Credits each (Total Credit Hrs. 6X4)	24
6	OEC - Open Elective courses	2 Course of 3Credits each (Total Credit Hrs.2X3)	06
7	Skill Enhancement Course (SEC)	6 Courses of 1Credits each (Total Credit Hrs. 6X1)	06
8	LC - Laboratory course	17 Courses of 1 Credits each (Total Credit Hrs. 17X1) 2 Courses of 2 Credits each (Total Credit Hrs.2X2)	21
9	PROJ-Skill based practical training & Industrial Training Report &Viva Voce for Dissertation	1 Course of 10 Credits each (Total Credit Hrs. 1X10) 1 Course of 8 Credits each (Total Credit Hrs. 1X8) 1 Course of 4 Credits each (Total Credit Hrs. 1X4) 2 Course of 2 Credits each (Total Credit Hrs. 2X2)	26
10	MOOC-Optional (credits will consider only in case a student fails to secure minimum required credits for the award of degree)	4 Course of 0 Credits each (Total Credit Hrs. 4X0)	00
Total Credits			**184**

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

B.Tech. Programme:

A new academic programme B.Tech.(Hons.)is introduced in order to facilitate the students to choose additionally the specialized courses of their choices and build their competence in a specialized area. The features of the new programme, include:

1. B.Tech. Student in regular stream can opt for B.Tech. (Hons.), provided he/she passed in all courses with minimum aggregate 75% marks up to the end of second semester.
2. For B. Tech (Hons), Student needs to earn additional 24 credits (over and above the required minimum 180 credits) relevant to her/his discipline as recommended by the faculty advisor.
3. The students opting for this program have to take four additional courses of their specialization of a minimum of 2 credits each from 3rd to 8th semesters.
4. The faculty advisor will suggest the additional courses to be taken by the students based on their choice and level of their academic competence.
5. The list of such additional courses offered by the NPTEL will be approved by the Hon'ble Vice Chancellor in the beginning of the academic year to facilitate the registration process.
6. The student can also opt for post graduate level courses.
7. The students have to submit the NPTEL course completion certificate to exam division for considering as B.Tech. (Hons)

* Student should have to take permission of registration for the B.Tech..(Hons.)degree from Hon'ble Vice Chancellor in starting of third semester.

C. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his/her target number of credits as specified by the AICTE/UGC and adopted by our university.

The following is the course module designed for the B.Tech. program:

- ***Program Core Course (PCC):*** Core courses of B.Tech. program will provide a holistic approach to engineering education, giving students an overview of the field, a basis to build and specialize upon. These core courses are the strong foundation to establish technical knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase.
  The core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know-while creating a common student experience that can foster deep understanding, develop decision-making ability and contribute to the society at large.
  A wide range of core courses provides groundwork in the basic engineering disciplines: Electronic Devices & Circuits, Engineering Electromagnetics, Microwave Techniques, Digital communication systems etc.
  The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various technical fields.
  We offer core courses from semester III onwards during the B.Tech. program. There will be 2, 3 and 4 credits for each core course offered.

- ***Open Elective Course (OEC):*** Open Elective is an interdisciplinary additional subject that is compulsory in a program. The score of Open Elective is counted in the overall aggregate marks under Choice Based Credit System (CBCS). Each Open Elective paper will be of 3 Credits in VII and VIII semesters. Each student has to take Open/Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Open Electives.

- ***Skill Enhancement Course (SEC):*** These Courses are a credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be four courses of Aptitude in Semester III, IV, V & VI semesters and two courses of Soft Skills in V &VI Semesters and will carry one credit.

- ***Professional Elective courses (PEC):*** The professional elective course is chosen to make students specialist or having specialized knowledge of a specific domain like Power system, Control system etc. It will be covered in three semesters (VI, VII & VIII) of Third and fourth years of the program relevant to chosen disciplines of core courses of the program. Each student will have to choosefiveprofessional elective courses (PECs): 1 in Semester VI, 2 in Semester VII and 2 in Semester VIII respectively.

D. Program Outcomes for Engineering:

PO – 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO – 2	**Problem analysis& Solving:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO – 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO – 4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO – 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO – 6	**Social Interaction & effective citizenship:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO – 7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO – 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO – 9	**Attitude (Individual and team work):** Function effectively as an individual, and as member or leader in diverse teams, and in multidisciplinary settings.
PO – 10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large such as, being able to comprehend and write effective reports and design documentation, make effective presentations,

	and give and receive clean instructions.
PO – 11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO – 12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO–13	**Entrepreneurship:** An Entrepreneurship cut across every sector of human life including the field of engineering, engineering entrepreneurship is the process of harnessing the business opportunities in engineering and turning it into profitable commercially viable innovation.
PO–14	**Interpersonal skills:** Interpersonal skills involve the ability to communicate and build relationships with others. Effective interpersonal skills can help the students during the job interview process and can have a positive impact on your career advancement.
PO–15	**Technology savvy/usage:** Being technology savvy is essentially one's skill to be smart with technology. This skill reaches far beyond 'understanding' the concepts of how technology works and encompasses the 'utilization' of such modern technology for the purpose of enhancing productivity and efficiency.

E. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of four-year **B.Tech. Program:**

PSO – 1	**Understanding** the concepts of basic sciences, humanities and core technical courses of Computer & Communication Engineering.
PSO – 2	**Applying**the skills to identify, formulate, design and investigate complex engineering problems of real time projects in the field of Computer and communication engineering in network and information technology domains
PSO – 3	**Applying** the acquired hardware and software knowledge to research and industrial practices while acquiring soft skills like persistence, proper judgment through these projects-based interactions.
PSO – 4	**Analysing** the applications of advance communication engineering concepts in the field of Computers, communication/ networking, security, signal processing, and embedded systems technology.
PSO – 5	**Evaluating** various computer and communication systems consisting of software and networking protocols through analytical knowledge in Computer & Communication Engineering with the help of modern tools.
PSO – 6	**Creating** hands on experiences and exposure in the field ofSoftware Engineering, Machine Learning, Microcontroller,Networking and IoT, etc.

F. Pedagogy & Unique practices adopted:

"Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will emphasize on experiential learning.

- ***Audio-Visual Based Learning:*** These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through video lectures. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through Audio visual Aids is a good idea and method. The learning

becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting *Audio-Visual Based Learning* wherever possible.

- ***Field / Live Projects*:** The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other than their regular classes.
- ***Industrial Visits:*** Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.
- ***MOOCs:*** Students may earn credits by passing MOOCs as decided by the college. Graduate level programs may award Honors degree provided students earn pre-requisite credits through MOOCs. University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.

  Keeping this in mind, University proposed and allowed a maximum of two credits to be allocated for each MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through onlyNPTEL could be given 2 credits for each MOOC course.

  For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

  a) This is recommended for every student to take at least one MOOC Course throughout the programme.
  b) There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.
  c) The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalize a list of courses to be offered with 2 credits defined for each course and the mode of credit consideration of the student. The complete process shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course, the approval will be valid only for the semester on offer.
  d) Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.
  e) After completion of MOOC course, Student will submit the photo copy of Completion certificate of MOOC Course to the Examination cell as proof.
  f) Marks will be considered which is mentioned on Completion certificate of MOOC Course.
  g) College will consider the credits only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.

- ***Special Guest Lectures (SGL) & Extra Mural Lectures (EML):*** Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

- ***Student Development Programs (SDP):*** Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.
- ***Industry Focusedprograms:*** Establishing collaborations with various industry partners to deliver the programme on sharing basis. The specific courses are to be delivered by industry experts to provide practice-based insight to the students.
- ***Special assistance program for slow learners & fast learners:*** There is a provision of identify slow learners; develop the mechanism to correcting knowledge gap through result analysis of various class tests. Extra classes will be arranged for slow learners and facilitate them with required study material. There are some terms of advance topics what learning challenging it will be provided to the fast learners.
- ***Induction program:*** Every year 3 weeks induction program is organized for 1st year students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.
- **Mentoring scheme:** There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.
- **Extra-curricular Activities:** organizing& participation in extracurricular activities will be mandatory to help students develop confidence & face audience boldly. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.
- **Career & Personal Counseling:** - Identifies the problem of student as early as possible and gives time to discuss their problems individually as well as with the parents.Counseling enables the students to focus on behavior and feelings with a goal to facilitate positive change.
  Its major role lies in giving: Advice, Help, Support, Tips, Assistance, and Guidance.
  Strategies: a) Once in a week the counselors meet the students in order to inquire about problems.
  b) Available 24x7 on SOS basis.
- **Participation in Workshops, Seminars & writing & Presenting Papers:** Departments plan to organize the workshops, Seminars & Guest lecturers time to time on their respective topics as per academic calendar. Students must have to attend these programs. These participations would be count in the marks of general Discipline & General Proficiency which is the part of course scheme as noncredit course.
- **Formation of Student Clubs, Membership &Organizing& Participating events:** Every department has the departmental clubs with the specific club name. The entire student's activity would be performed by the club. One faculty would be the coordinator of the student clubs & students would be the members with different responsibility.
- **Capability Enhancement & Development Schemes:** The Institute has these schemes to enhance the capability and holistic development of the students. Following measures/ initiatives are taken up from time to time for the same: Career Counseling, Soft skill development, Remedial Coaching, Bridge Course, Language Lab, Yoga and Meditation, Personal Counseling
- **Library Visit & Utilization of E-Learning Resources:** Student can visit the library from morning 10 AM to evening 8 PM. Library created its resources Database and provided Online Public Access Catalogue (OPAC) through which users can be accessed from any of the computer connected in the LAN can know the status of the book. Now we are in process to move from OPAC to KOHA.

a) Institute Library & Information is subscribing online e-books and e-journals databases (DELNET and EBSCO host E-databases) as per the requirement of the institute and fulfilling AICTE norms. IP based access is given to all computers connected on campus LAN to access e-journals.
b) For the effective utilisation of resources, Information Literacy training programs are conducted to the staff and students.
c) Wi-Fi enabled campus
d) Regular addition of latest books and journals
e) Well maintained e-library to access e-resources

Study & Evaluation Scheme

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

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	BSC-1	EAS116	Engineering Mathematics-I	3	1	-	4	40	60	100
2	BSC-2	EAS112/212	Engineering Physics	3	1	-	4	40	60	100
		EAS113/213	Engineering Chemistry							
3	ESC-1	EEE117/217	Basic Electrical Engineering	3	1	-	4	40	60	100
		EEC111/211	Basic Electronics Engineering							
4	AECC-1	TMU101	Environmental Studies	2	1	-	3	40	60	100
5	AECC-2	TGE103	English Communication- I	1	-	2	2	40	60	100
6	LC-1	EAS162/262	Engineering Physics (Lab)	-	-	2	1	50	50	100
		EAS163/263	Engineering Chemistry (Lab)							
7	LC-2	EEE161/261	Basic Electrical Engineering (Lab)	-	-	2	1	50	50	100
		EEC161/261	Basic Electronics Engineering (Lab)							
8	LC-3	EME161/261	Engineering Drawing (Lab)	-	-	4	2	50	50	100
		EME162/262	Workshop Practice (Lab)							
9	DGP-1	EGP111	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**12**	**4**	**10**	**21**	**450**	**450**	**900**

B.Tech. (Computer& Communication Engineering)
Semester II

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	BSC-3	EAS211	Engineering Mathematics-II	3	1	-	4	40	60	100
2	BSC-4	EAS212/112	Engineering Physics	3	1	-	4	40	60	100
		EAS213/113	Engineering Chemistry							
3	ESC-2	EEE217/117	Basic Electrical Engineering	3	1	-	4	40	60	100
		EEC211/111	Basic Electronics Engineering							
4	ESC-3	ECS212	Computer System & Programming in C++	3	-	-	3	40	60	100
5	AECC-3	TGE203	English Communication- II	1	-	2	2	40	60	100
6	LC-4	EAS262/162	Engineering Physics (Lab)	-	-	2	1	50	50	100
		EAS263/163	Engineering Chemistry (Lab)							
7	LC-5	EEE261/161	Basic Electrical Engineering (Lab)	-	-	2	1	50	50	100
		EEC261/161	Basic Electronics Engineering (Lab)							
8	LC-6	ECS262	Computer System &Programming in C++ (Lab)	-	-	2	1	50	50	100
9	LC-7	EME261/161	Engineering Drawing (Lab)	-	-	4	2	50	50	100
		EME262/162	Workshop Practice (Lab)							
10	DGP-2	EGP211	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**13**	**3**	**12**	**22**	**500**	**500**	**1000**

B.Tech. (Computer& Communication Engineering)
Semester III

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-1	CCE311	Signals & Systems	3	1	-	4	40	60	100
2	PCC-2	CCE312	Data Structure	3	1	-	4	40	60	100
3	PCC-3	CCE313	Digital Systems and Computer Organization	3	1	-	4	40	60	100
4	PCC-4	CCE314	Object Oriented Programming using JAVA	3		-	3	40	60	100
5	PCC-5	CCE315	Principles of Data Communication	3	-	-	3	40	60	100
6	PEC-1		Program Elective-I	3	1		4	40	60	100
7	LC-8	CCE361	Digital Logic & Circuits (Lab)	-	-	2	1	50	50	100
8	LC-9	CCE362	Data Structures (Lab)	-	-	2	1	50	50	100
9	LC-10	CCE363	Object oriented Programming using JAVA (Lab)	-	-	2	1	50	50	100
10	SEC-1	TGC307	Foundation in Quantitative Aptitude	-	-	2	1	50	50	100
11	DGP-3	EGP311	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**18**	**4**	**8**	**26**	**540**	**560**	**1100**

Following additional Course for Lateral Entry Students with B.Sc./Polytechnic background to be taken in III semester and all should pass with minimum of 45% marks for obtaining the degree: credits will not be added

1	LC	EME161/261	Engineering Drawing (Lab)	-	-	4	-	50	50	100
2		TMU101	Environmental Studies	2	1	-	-	40	60	100

B.Tech. (Computer& Communication Engineering)

Semester IV

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-6	CCE411	Machine Learning using Python Programming	3	1	-	4	40	60	100
2	PCC-7	CCE412	Computer Communication Network	3	-	-	3	40	60	100
3	PCC-8	CCE413	Database Management Systems	3	1	-	4	40	60	100
4	PCC-9	CCE414	Design and Analysis of Algorithms	3	1		4	40	60	100
5	PCC-10	CCE415	Operating Systems	3		-	3	40	60	100
6	LC-11	CCE461	Python Programming (Lab)	-	-	2	1	50	50	100
7	LC-12	CCE462	Operating System (Lab)	-	-	2	1	50	50	100
8	LC-13	CCE463	Algorithms (Lab)	-	-	2	1	50	50	100
9	LC-14	CCE464	Database Management System (Lab)	-	-	2	1	50	50	100
10	SEC-2	TGC407	Analytical Reasoning	-	-	2	1	50	50	100
11	DGP-4	EGP411	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**15**	**3**	**10**	**23**	**550**	**550**	**1100**

*Skill based Training/Internship on advance communication networksof 4 weeks duration from a reputed Industry/organization after completion of 4th semester end-semester examination.

Following additional Courses for Lateral Entry Students with B.Sc./Polytechnic background to be taken in IV semester and all should pass with minimum of 45% marks for obtaining the degree: credits will not be added

1	LC	EME162/262	Workshop Practice (Lab)	-	-	4	-	50	50	100

Semester V

S. No.	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-11	CCE511	Principles of Managements	3		-	3	40	60	100
2	PCC-12	CCE512	Data Mining and Predictive Analysis	3	1	-	4	40	60	100
3	PCC-13	CCE513	Digital Introduction and Cyber Security	3	-	-	3	40	60	100
4	PCC-14	CCE514	Advance Communication Networks	3	1	-	4	40	60	100
5	PCC-15	CCE515	Software Design Technology	3		-	3	40	60	100
6	OE-1		Open Elective-I	3	-	-	3	50	50	100
7	LC-15	CCE561	Advance Programming (Lab)	-	-	2	1	50	50	100
8	LC-16	CCE562	Data Mining and Predictive Analysis (Lab)	-	-	2	1	50	50	100
9	PROJ-1	CCE592	Skill based Practical Training on advance communication networks Presentation	-	-	2	2	50	50	100
10	SEC-3	TGC507	Modern Algebra and Data Management	-	-	2	1	50	50	100
11	SEC-4	TGC502	Self Management for Engineers	-	-	2	1	50	50	100
12	DGP-5	EGP511	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**18**	**2**	**10**	**26**	**600**	**600**	**1200**

MOOC Course:

1	MOOC-1	MOOC01	MOOC Program -I (Optional)	-	-	-	2	-	100	100

B.Tech. (Computer& Communication Engineering)

Semester VI

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-16	CCE611	Embedded System Design	3	1	-	4	40	60	100
2	PCC-17	CCE612	Wireless sensor network	3	-	-	3	40	60	100
3	PCC-18	CCE613	Concepts of Internet of Things	3	-		3	40	60	100
4	PEC-2		Program Elective-II	3	1	-	4	40	60	100
5	PEC-3		Program Elective-III	3	1	-	4	40	60	100
6	OE-2		Open Elective-II	3	-	-	3	40	60	100
7	LC-17	CCE661	Embedded System Design (Lab)	-	-	2	1	50	50	100
8	LC-18	CCE662	Mobile and IoT application Development (Lab)	-	-	2	1	50	50	100
9	SEC-5	TGC607	Advance Algebra and Geometry	-	-	2	1	50	50	100
10	SEC-6	TGC602	Workplace Management for Engineers	-	-	2	1	50	50	100
11	DGP-6	EGP611	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**18**	**3**	**8**	**25**	**540**	**560**	**1100**

*Industrial Training of 6 weeks duration from a reputed Industry/organization after completion of 6th semester end-semester examination.

MOOC Course:

1	MOOC-2	MOOC02	MOOC Program –II (Optional)	-	-	-	2	-	100	100

Semester VII

S. No.	Category	Course Code	Course		Periods			Evaluation Scheme			
					L	T	P	Credit	Internal	External	Total
1	PCC-19	CCE711	Digital Signal Processing		3	1	-	4	40	60	100
2	PEC-4		Program Elective	Program Elective-IV	3	1	-	4	40	60	100
3	PEC-5			Program Elective-V	3	1	-	4	40	60	100
4	PEC-6			Program Elective-VI	3	1		4	40	60	100
5	LC-19	CCE761	Digital Signal Processing (Lab)		-	-	2	1	50	50	100
8	PROJ-2	CCE762	Industrial Training & Presentation		-	-	-	2	50	50	100
9	PROJ-3	CCE763	Project Work Phase-I			-	8	4	200	-	200
10	DGP-7	EGP711	Discipline & General Proficiency		-	-	-	-	100	-	100
			Total		12	4	10	23	560	340	900

MOOC Course:

1	MOOC-3	MOOC03	MOOC Program –III (Optional)	-	-	-	2	-	100	100

B.Tech. (Computer& Communication Engineering)

Semester VIII

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PROJ-4	CCE861	Industry Immersion (Report based Viva-voce)	90 Days			08	-	400	400
2	PROJ-5	CCE862	Project Work Phase –II	90 Hours			10	200	300	500
3	DGP-8	EGP811	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	-	-	-	**18**	**300**	**700**	**1000**

MOOC Course:

1	MOOC-4	MOOC04	MOOC Program –IV (Optional)	-	-	-	2	-	100	100

ELECTIVE COURSES OFFERED

S.No	Code	Course	L	T	P	Credit
Semester III - Program Elective I-(Any one)						
Specialization in Advance Communication						
1	CCE301	Mobile Computing	3	1	0	4
2	CCE302	Multimedia Communication	3	1	0	4
3	CCE303	Information Theory & Coding	3	1	0	4
Semester VI - Program Elective II-(Any one)						
Specialization inIoT						
4	CCE601	Embedded System Design (Arduino/Raspberry Pi/Nano Jetson)	3	1	0	4
5	CCE602	Design Implementation of Internet of Things	3	1	0	4
6	CCE603	Network security & cryptography	3	1	0	4
Semester VII - Program Elective IV-(Any one)						
Specialization in Computational Intelligence						
7	CCE701	Artificial Intelligence	3	1	0	4
8	CCE702	Computer Vision	3	1	0	4
9	CCE703	Artificial Neural Network	3	1	0	4
Semester VII - Program Elective V-(Any one)						
Specialization in Computer Graphics & Visualization						
10	CCE704	Augmented & Virtual Reality	3	1	0	4
11	CCE705	Deep Learning	3	1	0	4
Semester VII - Program Elective VI-(Any one)						
Specialization in Data Analytics						
12	CCE706	Big Data Analytics	3	1	0	4
13	CCE707	Cloud Computing	3	1	0	4

Teerthanker Mahaveer University
Faculty of Engineering
Department of Electronics & Communication Engineering

Study & Evaluation Scheme

of

Master of Technology
(Specialization: Machine Learning & Data Sciences)

[Applicable w.e.f. Academic Session - 2022-23]
[As per CBCS guidelines given by AICTE]

12-B Status from UGC

TEERTHANKER MAHAVEER UNIVERSITY
N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

(Established under Govt. of U.P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad(U.P.)

Study & Evaluation Scheme

SUMMARY

Institute Name	*Faculty of Engineering*
Programme	**Master of Technology (Machine Learning & Data Sciences)**
Duration	*Two-year full time (Four Semesters)*
Medium	*English*
Minimum Required Attendance	*75%*

Credits

Maximum Credits	*74*
Minimum Credits Required for Degree	*74*

Assessment:

Evaluation	**Internal**	**External**	**Total**
Theory	40	60	100
Practical/ Dissertations/ Project Reports/ Viva-Voce	50	50	100

Class Test-1	**Class Test-2**	**Assignment(s)**	**Attendance & Participation**	**Total**
10	10	10	10	40

Duration of Examination	**External**	**Internal**
	3 Hours	1.5 Hours

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation (i.e. both internal and external).A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.
Maximum no of years required to complete the program: N+2 (N=No of years for program)

Question Paper Structure

1. *The question paper shall consist of six questions. Out of which the first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.*
2. *Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.*
3. *The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.*

IMPORTANT NOTES:

1. *The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to the attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyse, Evaluate & Create (reference to Bloom's Taxonomy).*
2. *Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching methods used as pedagogy.*
3. *There shall be continuous evaluation of the student and there will be a provision of a fortnight progress report.*

Program Structure- M.Tech (Machine Learning & Data Sciences)

A. Introduction:

High-quality M.Tech education is essential for the digital age. The main aim of this program is to produce quality professionals and research fellows who can work in every sector of the world by implementing the technology of computer systems and software. The programme introduces the various domains of computer science consisting of Artificial Intelligence, Advanced database management system, advanced data Structure and algorithms, cloud computing, semantic web, Big Data Analytics. Employability, innovation, theory to practice connectedness is the central focus of the M.Tech curriculum. The institute emphasis on the following courses ***balanced with core and elective courses:*** The programme structure and credits for M.Tech are finalized based on the stakeholders' requirements and general structure of the programme However, the minimum number of the credits for award of M.Tech degree will be 74 credits. Course handout is a thorough teaching plan of a faculty taking up a course. It is a blueprint which will guide the students about the pedagogical tools being used at different stages of the syllabus coverage and more specifically the topic-wise complete plan of discourse, that is, how the faculty members treat each and every topic from the syllabus and what they want the student to do, as an extra effort, for creating an effective learning. It may be a case study, a role-play, a classroom exercise, an assignment- home or field, or anything else which is relevant and which can enhance their learning about that particular concept or topic. Due to limited availability of time, most relevant topics will have this kind of method in course handout.

Program Course Summary

M.Tech (Machine Learning & Data Sciences) : Two-Years (4-Semester) CBCS Programme			
Basic Structure: Distribution of Courses			
S.No.	Type of Course	Credit Hours	Total Credits
1	Professional Core Course (PCC)	4 Courses of 4 Credit Hrs, (16) 4 Courses of 3 Credits Hrs (12)	28
2	Professional Elective Course (PEC)	1 Course of 4 Credits Hrs, (4) 1 Course of 3 Credits Hrs (3)	7
3	Laboratory Course (LC)	4 Courses of 2 Credits Hrs, (8) 1 Course of 1 Credit Hrs (1)	9
4	Project/ Seminar/ Dissertation (PROJ)	1 Course of 2 Credit Hrs. (2) 1 Course of 8 Credit Hrs (8) 1 Course of 20 Credit Hrs (20)	30
Total Credits			74

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University. The following is the course module designed for the M.Tech program:

Professional Core Course (PCC): Professional Core courses of M.Tech program will provide a holistic approach to master education, giving students an overview of the field, a basis to build and specialize upon. These core courses are the strong foundation to establish engineering knowledge and provide broad multi-disciplined knowledge that can be studied further in depth during the elective phase.

The core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know-while creating a common student experience that can foster deep understanding, develop decision-making ability and contribute to the business and community at large. A wide range of core courses provides groundwork in the basic engineering disciplines: The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various research fields.

Professional Elective Course (PEC): Professional Elective is an interdisciplinary additional subject thatis compulsory in the first, second and third semester of a program. The score of Professional Elective is counted in your overall aggregate marks under Choice Based Credit System (CBCS). Each Professional Elective paper will be of 7 Credits and students will have the choice of taking PEC's. We

offer two PEC in semester II and III. Each student has to take Professional Electives from departments other than the parent department.

Laboratory Courses (LC): A laboratory oriented course which will provide a platform to students to enhance their practical knowledge and skills by development of small applications/projects. We offer Laboratory courses in semester I, II and III during the M.Tech program. There will be total 9 credits.

C. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of two-years.

PSO – 1	Understanding and Analyzing the real time problems and to develop solutions by applying appropriate mathematical logic and algorithms.
PSO – 2	Applying knowledge in various domains to identify research gaps and hence to provide solutions to new ideas and innovations.
PSO – 3	Applying skills acquired for retrieving, analyzing and managing large data leading to effective decision making and application development using suitable engineering tools.

D. Pedagogy & Unique practices adopted: "Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture methods, the institute will emphasize on **experiential learning. :**

1. Case Based Learning:Case based learning enhances student skills at delineating the critical decision dilemmas faced by organizations, helps in applying concepts, principles and analytical skills to solve the delineated problems and develops effective templates for business problem solving. Case method of teaching is used as a critical learning tool for effective learning and we encourage it to the fullest.

2. Role Play & Simulation: Role-play and simulation are forms of experiential learning. Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings. Role-play and simulation function as learning tools for teams and groups or individuals as they "play" online or face-to-face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their explorations and the viewpoints of the character or personality they are articulating in the environment. This student-centered space can enable learner-oriented assessment, where the design of the task is created for active student learning. Therefore, role-play simulation exercises such as virtual share trading, marketing simulation etc. are being promoted for the practical-based experiential learning of our students.

3. Video Based Learning (VBL) & Learning through Movies (LTM): These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through movies. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through VBL & LTM is a good idea and method.

The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting VBL & LTM, wherever possible.

4. Field/Live Projects: The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live projects other than their regular classes.

5. Industrial Visits: Industrial visits are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out a report of such a visit relating to their specific topic, course or even domain.

6. MOOCS: Students may earn credits by passing MOOCs as decided by the college from time to time. (A) Degree level programmmes may be awarded Honors degree provided they earn prerequisite credits specified by UGC/ Concerned Council. (B) Few theoretical courses (Max 20%) may be identified by the respective Colleges for On-Line Learning (either Coursera or NPTL). The students may obtain the certificate of passing such courses from the concerned platform or the colleges may arrange to conduct exams for such identified courses and (C) A student may earn few extra credits (shall be considered as audit Courses) by independent Learning through any of the MOOCs Platform.

7. Special Guest Lectures (SGL)): Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry,we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and provide greater insights.

8. Student Development Programs (SDP): Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

9. Industry Focused Programs: Establishing collaborations with various industry partners to deliver the programme on sharing basis. The specific courses/contents are to be delivered by industry experts to provide practice based insight to the students.

10. Special Assistance Programme for Slow & Fast Learners: After the first class test (CT-1), we identify the slow learners and the fast learners on the basis of their performance in the class and test. We counsel the slow learners to assess the knowledge gap and provide them special assistance in terms of tutorial programmes in learning the subjects or topics. We motivate the fast learners to go through the various journals and references available in the library and online. We encourage the slow learners and the fast learners both to read the research papers and after reading them, they write the research papers with the help of their supervisors to be presented in conferences. We organise at least one international conference in each semester.

11. Orientation Program: We organize an Orientation Programme for the students to make them well aware of the rules and regulations of college and university including anti ragging policies.

12. **Mentoring Scheme:** Every Student shall be provided with a faculty Mentor to help him /her in their personal & Academic Issues. The mentor maintains a register of al all his/her mentees with complete personal & parents 'details. It is essential to have at least one meeting once in a month. The mentor enters the discussions held, advice given and efforts & improvements made by the mentee. This register of the mentor must be countersigned by the HOD once a month and by the principal once in a semester

13. **Career & Personal Counselling:** We have Training and Placement Cell for Career & Personal Counselling of the students.

14. **Competitive Exam Preparation:** Institute provides the foundation for the preparation of competitive exams. For this, special classes are conducted by the faculty members.

15. **Extra-curricular Activities:** We organize various extracurricular activities to help students develop confidence & face the audience with care. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.

16. **Participation in Workshops, Seminars & writing & Presenting Papers:** The purpose of Workshops, Seminars, and conferences are important for the overall development of the students. Here the students go through the discussion of a research area/ academic subject with the expert(s). College conducts at least one Workshop and at least one Seminar. In addition, the College also conducts one national and one international conference every year. Students actively participated in Workshops, Seminars & writing & Presenting Papers.

17. **Formation of Student Clubs , Membership & Organising And Participating events::** We find the interest of students and based upon that they are asked to join an existing club or found a new club. We have various clubs and various events take place among these clubs. The clubs organize events and participation depends on the nature of the event.

18. **Capability Enhancement & Development Schemes:** A student may have a wide spectrum of capabilities hidden inside. We explore the capability of students with the help of various events throughout the year and find the students with the caliber in a specific field or skill. We then shape the students by mentoring and providing resources and guidance which is required to make him an Ace of their field or skill.

19. **Library Visit & Utilization of E-Learning Resources:** libraries have supported education efforts by providing teaching resources, information and referral services. A more active approach has been taken by libraries offering educational classes or one-to-one tutoring programs. Libraries have outreach programs designed to meet the needs of specific groups of people with limited educational

Study & Evaluation Scheme

M.Tech. (Machine Learning & Data Sciences)

Semester I

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	PCC-1	MDS-111	Probabilistic Science for Data Analysis	3	1	-	4	40	60	100
2	PCC-2	MDS-112	Introduction to Data Mining	3	1	-	4	40	60	100
3	PCC-3	MDS-113	Machine Learning Techniques	2	1		3	40	60	100
4	PCC-4	MDS-114	Data Visualization and Interpretation	2	1		3	40	60	100
5	LC-1	MDS-151	Machine Learning Techniques Lab	-	-	4	2	50	50	100
6	LC-2	MDS-152	Data Visualization and Interpretation Lab	-	-	4	2	50	50	100
			Total	**10**	**4**	**8**	**18**	**260**	**340**	**600**

M.Tech (Machine Learning & Data Science)

Semester II

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	PCC-5	MDS-211	Introduction to Statistical Methods	3	-	-	3	40	60	100
2	PCC-6	MDS-212	Optimization Methods in Data Analytics	3	-	-	3	40	60	100
3	PCC-7	MDS-213	Big Data Analysis	3	-	-	4	40	60	100
4	PCE-1		Elective-I	3	-	-	3	40	60	100
5	LC-3	MDS-251	Introduction to Statistical Methods using R Lab	-	-	2	1	50	50	100
6	LC-4	MDS-252	Industrial Application based Programming using Python	-	-	4	2	50	50	100
			Total	**11**	**2**	**6**	**16**	**260**	**340**	**600**

M.Tech (Machine Learning & Data Science)

Semester III

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-8	MDS-311	Parametric Estimation	3	1	-	4	40	60	100
2	PCE-2		Elective-II	3	1	-	4	40	60	100
3	LC-5	MDS-351	Natural Language Processing			4	2	50	50	100
4	PROJ-1	MDS-352	Seminar based on Advanced Industrial Applications in the field of Machine Learning and Data Sciences	-	-	4	2	50	50	100
5	PROJ-2	MDS-353	Minor Project Based on Industrial Application in the field of AI/ ML/DL	-	-	-	8	50	50	100
			Total	**6**	**1**	**8**	**20**	**230**	**270**	**500**

M.Tech (Machine Learning & Data Science)

Semester IV

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal *	External *	Total
1	PROJ-3	MDS-451	Dissertation	-	-	-	20	250	250	500
			Total	-	-	-	**20**	**250**	**250**	**500**

Study & Evaluation Scheme

of

Bachelor of Technology
(Electronics & Communication Engineering)
(Specialization in IoT)
(In Collaboration with TCS-iON)

[Applicable w.e.f. Academic Session - 2023-24 till revised]

[As per CBCS guidelines given by AICTE]

Accredited with NAAC A Grade

12-B Status from UGC

TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in

Program Structure- B.Tech.(Electronics & Communication Engineering) (Specialization in IoT) (In Collaboration with TCS-iON)

A. Introduction:

Electronics & Communication Engineering is an ever-growing industry in today's digital scenario. It is the utilization of science and math applied to practical problems in the field of Electronics & Communication. Electronics & Communication Engineering engage in research, design, development and testing of the electronic equipment used in various communications systems. It is due to Electronics engineers that we enjoy such modern communication devices as cellular telephones, radios and television. The graduates are qualified for professional practise or to work in several areas of specialization. We prepare students as professional engineers through an education in fundamental principles presented in the context of real application and design. In addition to fundamentals of science and mathematics, the program provides a solid background in Devices & Circuits, Analog & Digital Electronics & Electromagnetic. Electronics & Communication Engineering finds applications in all fields of engineering and in daily life.

Students will develop and gain various skills that are transferable within the engineering world and practical skills that are equally useful in plenty of other sectors. Problem-solving skills are honed, and their interpersonal and communication skills will also improve with the amount of team work that they will be required to do. Students will also learn how to better manage their time and resources and assess the risks involved in a certain project. Other useful skills that they will learn include design, leadership and organisational skills.

The institute emphasis on the following courses ***balanced with core and elective courses***: The curriculum of B.Tech. program emphasizes an intensive, flexible engineering education. Total 197 credits are allotted for the B.Tech. degree.

The programme structure and credits for B.Tech. are finalized based on the stakeholders' requirements and general structure of the programme. Minimum number of class-room contact teaching credits for the B.Tech. program will be 197 credits (one credit equals 1.0 hour) and Project/internship will be of 12 credits. However, the minimum number of the credits for award of B.Tech. degree will be 192 credits. Out of 185 credits of classroom contact teaching, 51 credits are to be allotted for core courses (PCC), 16 credits are allotted to Basic Science Courses (BSC), 26 credits are allotted to Engineering Science Courses (ESC), 35 credits are allotted to AECC-Ability Enhancement Compulsory Course, 06 credits are allotted to open elective courses (OEC), 18 credits are allotted to Professional Elective courses, 06 credits are allotted to Skill Enhancement Course (SEC) and rest of 27 credits for Laboratory courses. Credits distribution is given below in tabular form:

TEERTHANKER MAHAVEER UNIVERSITY
(Established under Govt. of U.P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P.)

Study & Evaluation Scheme	
SUMMARY	
Institute Name	Faculty of Engineering
Programme	B.Tech. (Electronics & Communication Engineering)
Duration	Four-year full time (Eight Semesters)
Medium	English
Minimum Required Attendance	75%
Credits	
Maximum Credits	197
Minimum Credits Required for Degree	192

Assessment:					
Evaluation			Internal	External	Total
Theory			40	60	100
Practical/ Dissertations/ Project Reports/ Viva-Voce			50	50	100
Class Test-1	Class Test-2	Class Test-3	Assignment(s)	Attendance & Participation	Total
Best two out of three					
10	10	10	10	10	40
Duration of Examination			External	Internal	
			3 Hours	1.5 Hours	

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation (i.e. both internal and external).A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

Provision for delivery of 25% content through online mode.

Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.

Maximum no of years required to complete the program: N+2 (N=No of years for program)

Question Paper Structure	
1	The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.
2	Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.
3	The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.

IMPORTANT NOTES:	
1	The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to of attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).
2	Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.
3	There shall be continuous evaluation of the student and there will be a provision of fortnight progress report.

2. For B. Tech (Hons), Student needs to earn additional 24 credits (over and above the required minimum 180 credits) relevant to her/his discipline as recommended by the faculty advisor.
3. The students opting for this program have to take four additional courses of their specialization of a minimum of 2 credits each from 3rd to 8th semesters.
4. The faculty advisor will suggest the additional courses to be taken by the students based on their choice and level of their academic competence.
5. The list of such additional courses offered by the NPTEL will be approved by the Hon'ble Vice Chancellor in the beginning of the academic year to facilitate the registration process.
6. The student can also opt for post graduate level courses.
7. The students have to submit the NPTEL course completion certificate to exam division for considering as B.Tech. (Hons)

• Student should have to take permission of registration for the B.Tech.. (Hons.) degree from Hon'ble Vice Chancellor in starting of third semester.

C. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his/her target number of credits as specified by the AICTE/UGC and adopted by our university.

The following is the course module designed for the B.Tech. program:

- ***Program Core Course (PCC):*** Core courses of B.Tech. program will provide a holistic approach to engineering education, giving students an overview of the field, a basis to build and specialize upon. These core courses are the strong foundation to establish technical knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase.
  The core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know-while creating a common student experience that can foster deep understanding, develop decision-making ability and contribute to the society at large.
  A wide range of core courses provides groundwork in the basic engineering disciplines: Electronic Devices & Circuits, Engineering Electromagnetics, Microwave Techniques, Digital communication systems etc.
  The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various technical fields.
  We offer core courses from semester III onwards during the B.Tech. program. There will be 3 and 4 credits for each core course offered.

- ***Open Elective Course (OEC):*** Open Elective is an interdisciplinary additional subject that is compulsory in a program. The score of Open Elective is counted in the overall aggregate marks under Choice Based Credit System (CBCS). Each Open Elective paper will be of 3 Credits in VII and VIII semesters. Each student has to take Open/Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Open Electives.

- ***Ability Enhancement Compulsory Course (AECC):*** This is a compulsory course that does not have any choice and will be 2, 3, 5 credits. Each student of B.Tech. Program has to compulsorily pass the Environmental Studies and acquire 3 credits respectively.

B.Tech. -Electronics & Communication Engineering: Four-Year (8-Semester) CBCS Programme			
Basic Structure: Distribution of Courses			
S. No.	Type of Course	Credit Hours	Total Credits
1	BSC - Basic Science Courses	4 Courses of 4 Credits each (Total Credit Hrs. 4X4)	16
2	ESC - Engineering Science Courses	5 Courses of 4 Credits each (Total Credit Hrs. 5X4) 2 Courses of 3 Credits each (Total Credit Hrs. 2X3)	26
3	PCC - Professional core courses	9 Courses of 3 Credits each (Total Credit Hrs. 9X3) 6 Courses of 4 Credits each (Total Credit Hrs. 6X4)	51
4	PEC - Professional Elective courses	3 Courses of 4 Credits each (Total Credit Hrs. 3X4) 2 Courses of 3 Credits each (Total Credit Hrs. 2X3)	18
5	OEC - Open Elective courses	2 Course of 3 Credits each (Total Credit Hrs.2X3)	06
6	Skill Enhancement Course (SEC)	6 Courses of 1Credits each (Total Credit Hrs. 6X1)	06
7	LC - Laboratory course	21 Courses of 1 Credits each (Total Credit Hrs. 21X1) 3 Courses of 2 Credits each (Total Credit Hrs.3X2)	27
8	AECC-Ability Enhancement Compulsory Course	5 Course of 5 Credits each (Total Credit Hrs. 5X5) 2 Course of 3 Credits each (Total Credit Hrs. 2X3) 2 Course of 2 Credits each (Total Credit Hrs. 2X2)	35
9	PROJ-Skill based practical training & Industrial Training Report &Viva Voce for Dissertation	1 Course of 5 Credits each (Total Credit Hrs. 1X5) 1 Course of 3 Credits each (Total Credit Hrs. 1X3) 2 Course of 2 Credits each (Total Credit Hrs. 2X2)	12
10	MOOC-Optional (credits will consider only in case a student fails to secure minimum required credits for the award of degree)	As per the approval of Hon'ble Vice Chancellor	-
11	DGP- Discipline & General Proficiency	8 Course of 0 Credits each (Total Credit Hrs. 8X0)	00
Total Credits			197

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

B.Tech. (Honours) Programme:

A new academic programme B.Tech. (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses of their choices and build their competence in a specialized area. The features of the new programme, include:

1. B.Tech. Student in regular stream can opt for B.Tech. (Hons.), provided he/she passed in all courses with minimum aggregate 75% marks up to the end of second semester.

- ***Skill Enhancement Course (SEC):*** An Skill Enhancement Course is a credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be four courses of Aptitude in Semester III, IV, V & VI semesters and two courses of Soft Skills in V &VI Semesters and will carry 1 credit, as compulsory for every student to pass these courses with minimum 45% marks.

- ***Professional Elective courses (PEC):*** The professional elective course is chosen to make students specialist or having specialized knowledge of a specific domain like Power system, Control system etc. It will be covered in three semesters (VI, VII & VIII) of Third and fourth years of the program relevant to chosen disciplines of core courses of the program. Each student will have to choose five professional elective courses (PECs): 1 in Semester VI, 2 in Semester VII and 2 in Semester VIII respectively.

D. Program Outcomes for Engineering:

PO – 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO – 2	**Problem analysis& Solving:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO – 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO – 4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO – 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO – 6	**Social Interaction & effective citizenship:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO – 7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO – 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO – 9	**Attitude (Individual and team work):** Function effectively as an individual, and as member or leader in diverse teams, and in multidisciplinary settings.
PO – 10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clean instructions.
PO – 11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO – 12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO–13	**Entrepreneurship:** An Entrepreneurship cut across every sector of human life including the field of engineering, engineering entrepreneurship is the process of harnessing the business opportunities in engineering and turning it into profitable commercially viable innovation.
PO–14	**Interpersonal skills:** Interpersonal skills involve the ability to communicate and build relationships with others. Effective interpersonal skills can help the students during the job interview process and can have a positive impact on your career advancement.
PO–15	**Technology savvy/usage:** Being technology savvy is essentially one's skill to be smart with technology. This skill reaches far beyond 'understanding' the concepts of how technology works and encompasses the 'utilization' of such modern technology for the purpose of enhancing productivity and efficiency.

E. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of four-year **B.Tech. Program:**

PSO – 1	**Understanding** the concepts of basic sciences, humanities and core technical courses of Electronics & Communication Engineering.
PSO – 2	**Applying** the skills to identify, formulate, design and investigate complex engineering problems of real time projects in the field of electronics and communication engineering in analog, digital and hybrid system domains
PSO – 3	**Applying** the acquired hardware and software knowledge to research and industrial practices while acquiring soft skills like persistence, proper judgment through these projects-based interactions.
PSO – 4	**Analysing** the applications of core engineering concepts in the field of communication/ networking, signal processing, embedded systems and semiconductor technology.
PSO – 5	**Evaluating** various electrical, electronics and communication systems consisting of electrical and electronic components through analytical knowledge in Electronics & Communication Engineering with the help of modern tools.
PSO – 6	**Creating** hands on experiences and exposure in the field of Solar System, Microcontroller, PCB Designing and IoT, etc.

F. Pedagogy & Unique practices adopted:

"Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will emphasize on experiential learning.

- ***Audio-Visual Based Learning:*** These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through video lectures. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through Audio visual Aids is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting *Audio-Visual Based Learning* wherever possible.
- ***Field / Live Projects:*** The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other than their regular classes.
- ***Industrial Visits:*** Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.
- ***MOOCs:*** Students may earn credits by passing MOOCs as decided by the college. Graduate level programs may award Honors degree provided students earn pre-requisite credits through MOOCs.
  University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.
  Keeping this in mind, University proposed and allowed a maximum of two credits to be allocated for each MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through only NPTEL could be given 2 credits for each MOOC course.
  For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

  a) This is recommended for every student to take at least one MOOC Course throughout the programme.
  b) There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.
  c) The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalize a list of courses to be offered with 2 credits defined for each course and the mode of credit consideration of the student. The complete process shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course, the approval will be valid only for the semester on offer.
  d) Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.

e) After completion of MOOC course, Student will submit the photo copy of Completion certificate of MOOC Course to the Examination cell as proof.
f) Marks will be considered which is mentioned on Completion certificate of MOOC Course.
g) College will consider the credits only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.

- ***Special Guest Lectures (SGL) & Extra Mural Lectures (EML):*** Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.
- ***Student Development Programs (SDP):*** Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.
- ***Industry Focused programs:*** Establishing collaborations with various industry partners to deliver the programme on sharing basis. The specific courses are to be delivered by industry experts to provide practice-based insight to the students.
- ***Special assistance program for slow learners & fast learners:*** There is a provision of identify slow learners; develop the mechanism to correcting knowledge gap through result analysis of various class tests. Extra classes will be arranged for slow learners and facilitate them with required study material. There are some terms of advance topics what learning challenging it will be provided to the fast learners.
- ***Induction program:*** Every year 3 weeks induction program is organized for 1st year students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.
- **Mentoring scheme:** There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.
- **Extra-curricular Activities:** organizing& participation in extracurricular activities will be mandatory to help students develop confidence & face audience boldly. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.
- **Career & Personal Counseling:** - Identifies the problem of student as early as possible and gives time to discuss their problems individually as well as with the parents. Counseling enables the students to focus on behavior and feelings with a goal to facilitate positive change.
  Its major role lies in giving: Advice, Help, Support, Tips, Assistance, and Guidance.
  Strategies: a) Once in a week the counselors meet the students in order to inquire about problems. b) Available 24x7 on SOS basis.

- **Participation in Workshops, Seminars & writing & Presenting Papers:** Departments plan to organize the workshops, Seminars & Guest lecturers time to time on their respective topics as per academic calendar. Students must have to attend these programs. These participations would be count in the marks of general Discipline & General Proficiency which is the part of course scheme as noncredit course.

- **Formation of Student Clubs, Membership &Organizing& Participating events:** Every department has the departmental clubs with the specific club name. The entire student's activity would be performed by the club. One faculty would be the coordinator of the student clubs & students would be the members with different responsibility.

- **Capability Enhancement & Development Schemes:** The Institute has these schemes to enhance the capability and holistic development of the students. Following measures/ initiatives are taken up from time to time for the same: Career Counseling, Soft skill development, Remedial Coaching, Bridge Course, Language Lab, Yoga and Meditation, Personal Counseling

- **Library Visit & Utilization of E-Learning Resources:** Student can visit the library from morning 10 AM to evening 8 PM. Library created its resources Database and provided Online Public Access Catalogue (OPAC) through which users can be accessed from any of the computer connected in the LAN can know the status of the book. Now we are in process to move from OPAC to KOHA.
  a) Institute Library & Information is subscribing online e-books and e-journals databases (DELNET and EBSCO host E-databases) as per the requirement of the institute and fulfilling AICTE norms. IP based access is given to all computers connected on campus LAN to access e-journals.
  b) For the effective utilisation of resources, Information Literacy training programs are conducted to the staff and students.
  c) Wi-Fi enabled campus
  d) Regular addition of latest books and journals
  e) Well maintained e-library to access e-resources

Study & Evaluation Scheme

B.Tech. (Electronics & Communication Engineering)
(Specialization in IoT)
Semester I

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	BSC-1	EAS116	Engineering Mathematics-I	3	1	-	4	40	60	100
2	BSC-2	EAS112/212	Engineering Physics	3	1	-	4	40	60	100
		EAS113/213	Engineering Chemistry							
3	ESC-1	EEE117/217	Basic Electrical Engineering	3	1	-	4	40	60	100
		EEC111/211	Basic Electronics Engineering							
4	AECC-1	TMU101	Environmental Studies	2	1	-	3	40	60	100
5	AECC-2	TGE103	English Communication- I	1	-	2	2	40	60	100
6	LC-1	EAS162/262	Engineering Physics (Lab)	-	-	2	1	50	50	100
		EAS163/263	Engineering Chemistry (Lab)							
7	LC-2	EEE161/261	Basic Electrical Engineering (Lab)	-	-	2	1	50	50	100
		EEC161/261	Basic Electronics Engineering (Lab)							
8	LC-3	EME161/261	Engineering Drawing (Lab)	-	-	4	2	50	50	100
		EME162/262	Workshop Practice (Lab)							
9	DGP-1	EGP111	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**12**	**4**	**10**	**21**	**450**	**450**	**900**

Semester II

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	BSC-3	EAS211	Engineering Mathematics-II	3	1	-	4	40	60	100
2	BSC-4	EAS212/112	Engineering Physics	3	1	-	4	40	60	100
		EAS213/113	Engineering Chemistry							
3	ESC-2	EEE217/117	Basic Electrical Engineering	3	1	-	4	40	60	100
		EEC211/111	Basic Electronics Engineering							
4	ESC-3	ECS212	Computer System & Programming in C++	3	-	-	3	40	60	100
5	AECC-3	TMUTGE201	Business English	1	-	2	2	40	60	100
6	LC-4	EAS262/162	Engineering Physics (Lab)	-	-	2	1	50	50	100
		EAS263/163	Engineering Chemistry (Lab)							
7	LC-5	EEE261/161	Basic Electrical Engineering (Lab)	-	-	2	1	50	50	100
		EEC261/161	Basic Electronics Engineering (Lab)							
8	LC-6	ECS262	Computer System &Programming in C++ (Lab)	-	-	2	1	50	50	100
9	LC-7	EME261/161	Engineering Drawing (Lab)	-	-	4	2	50	50	100
		EME262/162	Workshop Practice (Lab)							
10	DGP-2	EGP211	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**13**	**3**	**12**	**22**	**500**	**500**	**1000**

Semester III

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-1	EEC311	Engineering Electromagnetics	3	1	-	4	40	60	100
2	PCC-2	EEC312	Digital Logic & Circuits	3	1	-	4	40	60	100
3	PCC-3	EEC313	Instruments and Measurements	3	-	-	3	40	60	100
4	PCC-4	EEC315	Signals & Systems	3	1	-	4	40	60	100
5	ESC-4	ECS312	Object oriented Programming using JAVA	3	1	-	4	40	60	100
6	**AECC (IHP)-4**	**TMUTGE301**	**Design Thinking**	**3**	**1**	**1**	**5**	**40**	**60**	**100**
7	LC-8	EEC361	Digital Logic & Circuits (Lab)	-	-	2	1	50	50	100
8	LC-9	EEC362	Instruments & Measurements (Lab)	-	-	2	1	50	50	100
9	LC-10	ECS361	Object oriented Programming using JAVA (Lab)	-	-	2	1	50	50	100
10	SEC-1	TGC307	Foundation in Quantitative Aptitude	-	-	2	1	50	50	100
11	DGP-3	EGP311	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**18**	**5**	**9**	**28**	**540**	**560**	**1100**

Following additional Course for Lateral Entry Students with B.Sc./Polytechnic background to be taken in III semester and all should pass with minimum of 45% marks for obtaining the degree: credits will not be added

1	LC	EME161/261	Engineering Drawing (Lab)	-	-	4	-	50	50	100
2		TMU101	Environmental Studies	2	1	-	-	40	60	100

Semester IV

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-5	EEC411	Analog Communication System	3	-	-	3	40	60	100
2	PCC-6	EEC412	Electronic Devices & Circuits	3	-	-	3	40	60	100
3	ESC-5	EEE413	Network Analysis & Synthesis	3	1	-	4	40	60	100
4	AECC (IIIP)-5	TMUTGE401	Practical Approach to Cybersecurity	3	1	1	5	40	60	100
5	ESC-6	ECS411	Database Management System	3	-	-	3	40	60	100
6	LC-11	EEC461	Analog Communication System (Lab)	-	-	2	1	50	50	100
7	LC-12	EEC462	Electronic Devices & Circuits (Lab)	-	-	2	1	50	50	100
8	LC-13	EEE463	Network Analysis & Synthesis (Lab)	-	-	2	1	50	50	100
9	LC-14	ECI464	Database Management System (Lab)	-	-	2	1	50	50	100
10	SEC-2	TGC407	Analytical Reasoning	-	-	2	1	50	50	100
11	DGP-4	EGP411	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**15**	**2**	**11**	**23**	**550**	**550**	**1100**

*Skill based Training/Internship of 4 weeks duration from a reputed Industry/organization after completion of 4th semester end-semester examination.

Following additional Courses for Lateral Entry Students with B.Sc./Polytechnic background to be taken in IV semester and all should pass with minimum of 45% marks for obtaining the degree: credits will not be added

1	LC	EME162/262	Workshop Practice (Lab)	-	-	4	-	50	50	100

Semester V

S. No.	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-7	EEC511	Microprocessor & Applications	3	1	-	4	40	60	100
2	PCC-8	EEC512	Microwave Techniques	3	-	-	3	40	60	100
3	PCC-9	EEC513	Digital Communication Systems	3	-	-	3	40	60	100
4	ESC-7	EEE511	Control Systems	3	1	-	4	40	60	100
5	AECC (IHP)-6	EC1514	Applied Nano-electronics	3	1	1	5	40	60	100
6	LC-15	EEC561	Microprocessor & Applications (Lab)	-	-	2	1	50	50	100
7	LC-16	EEC562	Microwave Techniques (Lab)	-	-	2	1	50	50	100
8	LC-17	EEC563	Digital Communication Systems (Lab)	-	-	2	1	50	50	100
9	PROJ-1	EEC592	Skill based Practical Training & Presentation	-	-	-	2	50	50	100
10	SEC-3	TGC507	Modern Algebra and Data Management	-	-	2	1	50	50	100
11	SEC-4	TGC502	Self Management for Engineers	-	-	2	1	50	50	100
12	DGP-5	EGP511	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	15	3	11	26	600	600	1200

MOOC Course:

1	MOOC-1	MOOC01	MOOC Program -I (Optional)	-	-	-	2	-	100	100

Semester VI

S. No	Category	Course Code	Course	Periods			Evaluation Scheme			
				L	T	P	Credit	Internal	External	Total
1	PCC-10	EEC613	Analog and Digital Integrated Electronics	3	-	-	3	40	60	100
2	PCC-11	EEC614	Antenna & Wave Propagation	3	1	-	4	40	60	100
3	AECC (IHP)-7	EC1615	Embedded System design using ARM Microcontrollers	3	1	1	5	40	60	100
4	PCC-12	EEC616	Mobile and Cellular Communication	3	-	-	3	40	60	100
5	PEC-1		Program Elective / Program Elective-I	3	1	-	4	40	60	100
6	AECC-8	EHM613	Human Values & Professional Ethics	3	-	-	3	40	60	100
7	LC-18	EEC661	Analog and Digital Integrated Electronics (Lab)	-	-	2	1	50	50	100
8	LC-19	EEC662	Antenna & Wave Propagation (Lab)	-	-	2	1	50	50	100
9	SEC-5	TGC607	Advance Algebra and Geometry	-	-	2	1	50	50	100
10	SEC-6	TGC602	Workplace Management for Engineers	-	-	2	1	50	50	100
11	DGP-6	EGP611	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**18**	**3**	**9**	**26**	**540**	**560**	**1100**

*Industrial Training of 6 weeks duration from a reputed Industry/organization after completion of 6th semester end-semester examination.

MOOC Course:

1	MOOC-2	MOOC02	MOOC Program –II (Optional)	-	-	-	2	-	100	100

Semester VII

S. No.	Category	Course Code	Course		Periods			Evaluation Scheme			
					L	T	P	Credit	Internal	External	Total
1	PCC-13	EEC711	Digital Signal Processing		3	1	-	4	40	60	100
2	PEC-2		Program Elective	Program Elective-II	3	1	-	4	40	60	100
3	PEC-3			Program Elective-III	3	-	-	3	40	60	100
4	**AECC (IHP)-9**	**ECI714**	**IoT and its Applications using Raspberry Pi**		**3**	**1**	**1**	**5**	**40**	**60**	**100**
5	OEC-1		Open Elective	Open Elective-I	3	-	-	3	40/50	60/50	100
6	LC-20	EEC763	Digital Signal Processing (Lab)		-	-	2	1	50	50	100
7	LC-21	EEC764	Electronic Workshop & PCB (Lab)		-	-	2	1	50	50	100
8	LC-22	EEC762	Design and Installation of Solar Photovoltaic System (Lab)		-	1	2	2	50	50	100
9	PROJ-2	EEC792	Industrial Training & Presentation		-	-	-	2	50	50	100
10	PROJ-3	EEC798	Project Work Phase-1		1	-	8	5	100	-	100
11	DGP-7	EGP711	Discipline & General Proficiency		-	-	-	-	100	-	100
			Total		**16**	**4**	**15**	**30**	**600/610**	**500/490**	**1100**

MOOC Course:

1	MOOC-3	MOOC03	MOOC Program –III (Optional)	-	-	-	2	-	100	100

Semester VIII

S. No	Category	Course Code	Course		Periods			Evaluation Scheme			
					L	T	P	Credit	Internal	External	Total
1	PCC-14	EEC811	VLSI Design &Technology		3	-	-	3	40	60	100
2	PCC-15	EEC812	Optical Fiber Communication		3	-	-	3	40	60	100
3	PEC-4		Program Elective	Program Elective-IV	3	1	-	4	40	60	100
4	PEC-5			Program Elective-V	3	-	-	3	40	60	100
5	OEC-2		Open Elective	Open Elective-II	3	-	-	3	40/50	60/50	100
6	LC-23	EEC862	VLSI Design &Technology (Lab)		-	-	2	1	50	50	100
7	LC-24	EEC863	Optical Fiber Communication (Lab)		-	-	2	1	50	50	100
8	PROJ-4	EEC898	Project Work Phase –II		1	-	4	3	50	50	100
9	DGP-8	EGP811	Discipline & General Proficiency		-	-	-	-	100	-	100
			Total		**16**	**1**	**8**	**21**	**450/460**	**450/440**	**900**

MOOC Course:

1	MOOC-4	MOOC04	MOOC Program –IV (Optional)	-	-	-	2	-	100	100

ELECTIVE COURSES OFFERED

S. No	Code	Course	L	T	P	Credit
Semester VI- Program Elective I -(Any one)						
Specialization in Microcontroller Programming						
1	EEC612	Embedded System	3	1	0	4
2	EEC617	Microcontroller Hardware, Programming & its Application (Arduino)	3	1	0	4
3	EEC628	Power Electronics	3	1	0	4
Semester VII- Program Elective II - (Any one)						
Specialization in Industrial Management						
4	EHM731	Principle of Management	3	1	0	4
5	EHM735	Industrial Sociology	3	1	0	4
6	EHM733	Organizational Behavior	3	1	0	4
Semester VII- Program Elective III - (Any one)						
Specialization in Robotics and Machine Learning						
7	EEC731	Robotics & Automation	3	0	0	3
8	EEC732	Machine Learning & Data Analytics	3	0	0	3
Semester VIII- Program Elective IV - (Any one)						
Specialization in Industrial Management						
9	EHM831	Engineering and Managerial Economics	3	1	0	4
10	EHM832	Total Quality Management	3	1	0	4
11	EHM833	Entrepreneurship	3	1	0	4
Semester VIII- Program Elective V - (Any one)						
Specialization in Soft Computing Techniques						
12	EEC831	Artificial Neural Network	3	0	0	3
13	EEC815	Information Theory & Coding	3	0	0	3
14	ECS832	Network Security & Cryptography	3	0	0	3

Study & Evaluation Scheme

of

Diploma in Electronics Engineering (Specialization in Robotics & Automation)

[Applicable w.e.f. Academic Session - 2023-24 till revised]
[As per CBCS guidelines given by UGC]

Accredited with NAAC A Grade
12-B Status from UGC

TEERTHANKER MAHAVEER UNIVERSITY
N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

Study & Evaluation Scheme SUMMARY	
Institute Name	Faculty of Engineering, T.M.U., Moradabad
Program	Diploma in Electronics Engineering (Specialization in Robotics & Automation)
Duration	Three Years full time(Six Semesters)
Medium	English/Hindi
Minimum Required Attendance	75%
Credits	
Maximum Credits	153
Minimum Credits Required for Diploma	149

Assessment:					
Evaluation			Internal	External	Total
Theory			40	60	100
Practical/ Dissertations/ Project reports/ Viva-Voce			50	50	100
Class Test-1	Class Test-2	Class Test-3	Assignment(s)	Attendan ce & Participation	Total
Best two out of three					
10	10	10	10	10	40
Duration of Examination			External	Internal	
			3 Hours	1.5 Hours	

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation. (i.e. both internal and external) A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

Question Paper Structure	
1	The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.
2	Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.
3	The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.

IMPORTANT NOTES:	
1	The purpose of examination should be to assess the Course Learning Outcomes (CLO) that will ultimately lead to of attainment of Program Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).
2	There shall be continuous evaluation of the student.

Program Structure – Diploma in Engineering

A. Introduction:

Diploma in Engineering is a backbone of all innovation to build the nation, by imparting quality skill development and training in emerging field. It achieve excellence in innovation simultaneously respond to the demand of the society by engaging in lifelong learning and earning. They usually involve in analyzing and providing solutions to real life situations.

Diploma in Engineering program has evergreen scope as it gives enormous job opportunities from local to international companies and secures life-long career. Today no technical innovation is possiblewithout the help of core branches of Diploma in Engineering i.e. Civil, Computer, Electronics, Electrical and Mechanical. Curriculum for Diploma in engineering degree trains the students to work in the vast range of Engineering sectors. To develop understanding of scientific principles and analytical ability, its curriculum starts with courses in basic sciences. These are followed by courses in engineering sciences to offer a smooth transition from basic sciences to professional Diploma in Engineering courses. Teaching of subjects in Basic Sciences and Humanities incorporated to develop appreciation of the impact and scope of science and technology on society. Attention is also paid to develop communication skills in English language. In addition, the program consisted of six semesters not only includes teaching of core courses but also includes program elective, field work/project, value added and open elective courses. The University strives to cultivate among its students a strong desire and capacity for continuous learning as well as self-appraisal to develop sterling human & professional qualities and a strong sense of service to society through designed, curricular, co-curricular activities and congenial campus environment.

After completing their Diploma in Engineering, students hold lucrative opportunities in many renowned industries, some launch their own start-ups, while some appears for B. Tech. to pursue higher studies in the chosen specializations. Diploma in Engineering holders will have ample opportunities in industries like Telecommunication, Automobile and Electronics equipment manufacturing, production, construction in real states etc. It has application right from manufacturing plants, vehicles, ships, robots, heating and cooling systems, aircrafts, even in medical devices. Mechanical engineers are generally hired by manufacturing industries, defense, PWD and Telegraphs etc. Electronic and electrical engineers have opportunities in many industries, with the main areas being in electronics, IT, manufacturing, power, transport, construction, telecommunications, research and development, and petrochemicals. Civil engineers have abundant chances in construction of new set up and building in real state.

Each branch specific in Diploma in Engineering not only provides the environment of solutions to the problems faced by human being but also facilitates the universe with advance technology. Diploma in Engineering demands creativity, technical, analytical and problem solving skills as whole sole interest to soar high in this career. Engineers are considered as creator and innovator of advancements in future. So be the part of Diploma in engineering society and be the creator and innovator!!!

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

Diploma :Three-Years(6-Semester) CBCS Program			
Basic Structure: Distribution of Courses			
S. No.	Type of Course	Credit Hours	Total Credits
1	Core Course(CC)	10Courses of 4 Credit each(Total Credit10X4=40)7Coursesof 1Credit each(Total Credit 7X1=7) 2Coursesof 2Crediteach(Total Credit 2X2=4)	51
2	Discipline Specific Course(DSC)	9 Courses of 4 Credits each(Total Credit9X4=36) 5Coursesof 1Crediteach(Total Credit 5X1=5) 4Coursesof 2Credit each(Total Credit 4X2=8)	49
3	Ability-Enhancement Compulsory Course (AECC)	2 Courses of 4 Credit each (Total Credit 2X4=8) 2 Courses of 2 Credit each (Total Credit 2X2=4)	12
4	Discipline Specified Elective Course(DSEC)	1 Course of 4 Credit each(Total Credit 1X4=4) 1 Course of 3 Credit each(Total Credit 1X3=3) 1Courseof 1Crediteach(Total Credit1X1=1)	8
5	Skill Enhancement Course for Industrial training and Major project (SEC)	4 courses of 1 Credit each (Total Credit 4X1=4) 1 Course of 3 Credit each(Total Credit 1X3=3) 2Courseof 8Crediteach(Total Credit 2X8=16) 1Courseof10Crediteach(Total Credit 1X10=10)	33
Total Credits			153

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the Diploma in Electronics program:

Core Course (CC): Core courses of Diploma program will provide a holistic approach to Diploma in Engineering, giving students an overview of the field, a basis to build and specialize upon. These compulsory courses are the strong foundation to establish engineering knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase.

The compulsory/Core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know -while creating a common student experience that can foster deep understanding, develop decision- making ability and contribute to the engineering and community at large.

A wide range of compulsory courses with four credits hours each provides groundwork in the engineering disciplines: Applied Physics, Applied Chemistry, Applied Mathematics, Applied Mechanics, Computer Fundamentals, Internet & MS office, Basic Civil & Electrical Engineering, & Basic of Electronics and

Mechanical Engineering etc. The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various business fields.

Ability Enhancement Compulsory Course (AECC): As per the guidelines of Choice Based Credit System (CBCS) for all Universities, including the private Universities, the Ability Enhancement Compulsory Course (AECC) is a course designed to develop the ability of students in communication (especially English) and other related courses where they might find it difficult to communicate at a higher level in their prospective job at a later stage due to lack of practice and exposure in the language, etc. Students are motivated to learn the theories, fundamentals and tools of communication which can help them develop and sustain in the corporate environment and culture.

These are compulsory course that do not have any choice. Each student of Diploma in engineering program has to compulsorily pass the Environment Studies, Human Values and Professional Ethics and Entrepreneurship course.

Discipline Specified Course (DSC): These are discipline Specific course that do not have any choice and will be of different credits each. Each student of Diploma in engineering program has to compulsorily pass the discipline Specific course.

A wide range of Discipline Specific courses with four credits hours each provides groundwork in the engineering disciplines: Electronic Devices and Circuits, Principle of Communication, Electrical Engineering & Machines, Network Filters & Transmission Lines, Electronic Instruments & Measurement, Communication Systems & some of lab courses related to above specific courses etc.

Skill Enhancement Course (SEC): An Skill Enhancement Course is a credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world.

D. Program Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of three-year **Diplomain Electronics Engineering Program**

PSO1:	Understanding the concept and applying the skills gained from Mathematics, Computing, Science and Social Science.
PSO2:	Design and develop efficient Automation system to enhance the quality of life by applying fundamentals of Basic Science, Mechanical and Mechatronics Engineering
PSO3:	Analyses and improve the performance of Manufacturing and Production system by implementing the Soft and hard Computing methods
PSO4:	Manage and lead a professional or an entrepreneur career in industries by applying modern Engineering, Management principles and best practices
PSO5:	Creating a structure or pattern from diverse elements.

E. Pedagogy & Unique practices adopted: "Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will **emphasize on experiential learning:**

1. Audio-Visual Based Learning: These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through video lectures. In fact, many teachersgive examples from movies during their discourses. Making students learn few important theoretical concepts through Audio visual Aids is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting *Audio-Visual Based Learning* wherever possible.

2. Field/Live Projects: The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other than their regular classes.

3. Industrial Visits: Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

4. Special Guest Lectures (SGL) & Extra Mural Lectures (EML): Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture- series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

5. Student Development Program (SDP): Harnessing and developing the right talent for the rightindustry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced

excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

6. Industry Focused program: Establishing collaborations with various industry partners to deliver the program on sharing basis. The specific courses are to be delivered by industry experts to provide practice based insight to the students.

7. Special assistance program for slow learners & fast learners: There is a provision of identify slow learners; develop the mechanism to correcting knowledge gap through result analysis of various class tests. Extra classes will be arranged for slow learners and facilitate them with required study material. There are some terms of advance topics what learning challenging it will be provided to the fast learners.

8. Induction program: Every year 3 weeks induction program is organized for 1st year students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.

9. **Mentoring scheme:** There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.

10. **Competitive exam preparation:** Students are provided with one class in every week for Competitive exams preparation.

11. **Extracurricular Activities:** organizing & participation in extracurricular activities will be mandatory to help students develop confidence & face audience with care.

Diploma in Electronics Engineering (Specialization in Robotics & Automation)

Diploma – Semester I

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-1	DIP111	Applied Mathematics – I	4	0	0	4	40	60	100
2	CC-2	DIP112/ DIP113	Applied Physics/ Applied Chemistry	4	0	0	4	40	60	100
3	CC-3	DIP104/ DIP105	Basics of Electrical & Civil Engineering / Basics of Electronics & Mechanical Engineering	4	0	0	4	40	60	100
4	CC-4	DIP131/ DIP107	Computer Fundamentals, Internet & MS-Office/ Applied Mechanics	4	0	0	4	40	60	100
5	AECC-1	TGE104	English Communication-I	1	0	2	2	40	60	100
6	CC-5	DIP181/ DIP182	Physics Lab/Chemistry Lab	0	0	2	1	50	50	100
7	CC-6	DIP153/ DIP154	Electrical Engineering Lab / Electronics Engineering Lab	0	0	2	1	50	50	100
8	CC-7	DIP155/ DIP156	Information Technology Lab /Applied Mechanics Lab	0	0	2	1	50	50	100
9	CC-8	DIP187/ DIP188	Workshop Practice / Engineering Drawing	0	0	4	2	50	50	100
Total				**17**	**0**	**12**	**23**	**400**	**500**	**900**

Diploma in Electronics Engineering (Specialization in Robotics & Automation)

Diploma – Semester II

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-9	DIP201	Applied Mathematics – II	4	0	0	4	40	60	100
2	CC-10	DIP203/ DIP202	Applied Chemistry/ Applied Physics	4	0	0	4	40	60	100
3	CC-11	DIP205/ DIP204	Basics of Electronics &Mechanical Engineering / Basics of Electrical & Civil Engineering	4	0	0	4	40	60	100
4	CC-12	DIP207/ DIP231	Applied Mechanics / Computer Fundamentals, Internet & MS-Office	4	0	0	4	40	60	100
5	AECC-2	TGE204	English Communication-II	1	0	2	2	40	60	100
6	CC-13	DIP252/ DIP251	Chemistry Lab/Physics Lab	0	0	2	1	50	50	100
7	CC-14	DIP254/ DIP253	Electronics Engineering Lab / Electrical Engineering Lab	0	0	2	1	50	50	100
8	CC-15	DIP256/ DIP255	Applied Mechanics Lab / Information Technology Lab	0	0	2	1	50	50	100
9	CC-16	DIP258/ DIP257	Engineering Drawing / Workshop Practice	0	0	4	2	50	50	100
Total				17	0	12	23	400	500	900

Diploma in Electronics Engineering (Specialization in Robotics & Automation)

Diploma-Semester III

S. No.	Category	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-17	DEC301	Digital Electronics	4	0	0	4	40	60	100
2	DSC-1	DEC302	Electronics Devices & Circuits	4	0	0	4	40	60	100
3	DSC-2	DEC303	Principles of Communication Engineering	4	0	0	4	40	60	100
4	DSC-3	DEE305	Electrical Engineering & Machines	4	0	0	4	40	60	100
5	CC-18	DEC351	Digital Electronics Lab	0	0	2	1	50	50	100
6	DSC-4	DEC352	Electronics Devices & Circuits Lab	0	0	2	1	50	50	100
7	DSC-5	DEC353	Principles of Communication Engineering Lab	0	0	2	1	50	50	100
8	DSC-6	DEE355	Electrical Engineering & Machines Lab	0	0	2	1	50	50	100
9	SEC-1	DEC355	Minor Project	0	0	6	3	50	50	100
10	SEC-2	TDC301	Soft Skills for Technical Supervisors	0	0	2	1	50	50	100
11	SEC-3	TDC302	Elementary Arithmetic & Reasoning	0	0	2	1	50	50	100
12	SEC-4	DDGP301	Discipline & General Proficiency	0	0	0	0	100	0	100
	Total			16	0	18	25	610	590	1200

***Additional course VAC-1for Lateral entry students with 10+2/Intermediate background.**

1	VAC-1	DIP359*	Concepts of Information System Lab	0	0	2	0	50	50	100

Diploma in Electronics Engineering (Specialization in Robotics & Automation)

Diploma-Semester IV

S. No.	Category	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-7	DEC401	Network Filters & Transmission Lines	4	0	0	4	40	60	100
2	AECC-3	DIP403/ DIP308	Environment Studies	4	0	0	4	40	60	100
3	DSC-8	DEC403	Electronic Instruments & Measurement	4	0	0	4	40	60	100
4	DSC-9	DEC404	Communication Systems	4	0	0	4	40	60	100
5	CC-19	DCS407	Computer Network	4	0	0	4	40	60	100
6	DSC-10	DEC451	Network Filters & Transmission Lines Lab	0	0	4	2	50	50	100
7	DSC-11	DEC453	Electronic Instruments & Measurement Lab	0	0	4	2	50	50	100
8	DSC-12	DEC454	Communication Systems Lab	0	0	2	1	50	50	100
9	SEC-5	TDC402	Progressive Algebra & Data Management	0	0	2	1	40	60	100
10	SEC-6	TDC401	Soft Skills for Workplace for Technical Supervisors	0	0	2	1	50	50	100
11	SEC-7	DDGP401	Discipline & General Proficiency	0	0	0	0	100	0	100
	Total			20	0	14	27	540	560	1100

*Student will go for Summer Internship for 6-8 Weeks.

Diploma in Electronics Engineering (Specialization in Robotics & Automation)

Diploma-Semester V

S. No.	Category	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-13	DRA501	Automatic Control Systems	4	0	0	4	40	60	100
2	DSC-14	DRA502	Microcontrollers and PLC	4	0	0	4	40	60	100
3	DSC-15	DRA503	Introduction to Robotics	4	0	0	4	40	60	100
4	AECC-4	DIP505	Human Values & Professional Ethics	4	0	0	4	40	60	100
5	DSEC-1	-	Minor specialization Specific Elective Course – I	4	0	0	4	40	60	100
6	DSEC-2	-	Minor specialization Specific Elective Course – II	3	0	0	3	40	60	100
7	DSC-16	DRA551	Automatic Control Systems lab	0	0	2	1	50	50	100
8	DSC-17	DRA552	Microcontroller Lab	0	0	4	2	50	50	100
9	DSC-18	DRA553	Robotics Laboratory	0	0	4	2	50	50	100
10	DSEC-3	-	Minor specialization Specific Elective Lab – I	0	0	2	1	40	60	100
11	SEC-8	DEC555	Industrial Training(Evaluation)	0	0	0	8	50	50	100
12	SEC-9	DDGP501	Discipline & General Proficiency	0	0	0	0	100	0	100
	Total			23	0	12	37	590	610	1200

Diploma in Electronics Engineering (Specialization in Robotics & Automation)
Diploma-Semester-VI

SN	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	SEC-10	DRA661	Industry Immersion based on minor specialization	90 Days			08	200	200	400
2	SEC-11	DRA662	Project Work Phase-I	90 Days			10	250	250	500
3	SEC-12	DDGP601	Discipline & General Proficiency	0	0	0	0	100	0	100
Total							18	550	450	1000

Curriculum

ELECTIVECOURSESOFFERED

Minor specialization Specific Elective Course – I
(Student can select any one open elective offered by university)

S. No	Code	Course	L	T	P	Credit
		Semester V (Anyone)				
1	DRA504	Sensors and Instrumentation	4	0	0	4
2	DRA505	Virtual Instrumentation	4	0	0	4
Minor specialization Specific Elective Course – II (Student can select any one open elective offered by university)						
1	DRA506	Power Electronics and Drives	3	0	0	3
2	DRA507	Automation System Design	3	0	0	3

Minor specialization Specific Elective Lab – I
(Student can select any one open elective offered by university)

S. No	Code	Course	L	T	P	Credit
		Semester V (Anyone)				
1	DRA554	Power Electronics and Drives Laboratory	0	0	2	1
2	DRA555	Automation System Design Laboratory	0	0	2	1

Note:			
L-Lecture	T-Tutorial	P-Practical	C-Credits
1L= 1Hour	1T= 1 Hour	1P= 1 Hour	1C= 1HourLorT 1C= 2HourP

Study & Evaluation Scheme

Of

Diploma in Electronics Engineering (Specialization in Data Sciences)

[Applicable w.e.f. Academic Session - 2023-24 till revised]
[As per CBCS guidelines given by UGC]

Accredited with NAAC A Grade
12-B Status from UGC

TEERTHANKER MAHAVEER UNIVERSITY
N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

Study & Evaluation Scheme SUMMARY	
Institute Name	Faculty of Engineering, T.M.U., Moradabad
Program	Diploma in Electronics Engineering (Specialization in Data Sciences)
Duration	Three Years full time(Six Semesters)
Medium	English/Hindi
Minimum Required Attendance	75%
Credits	
Maximum Credits	153
Minimum Credits Required for Diploma	149

Assessment:			
Evaluation	Internal	External	Total
Theory	40	60	100
Practical/ Dissertations/ Project reports/ Viva-Voce	50	50	100
Class Test-1 / Class Test-2 / Class Test-3 — Best two out of three	Assignment(s)	Attendan ce & Participation	Total
10 / 10 / 10	10	10	40
Duration of Examination	External	Internal	
	3 Hours	1.5 Hours	

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation. (i.e. both internal and external).A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

Question Paper Structure	
1	The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.
2	Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.
3	The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.

IMPORTANT NOTES:	
1	The purpose of examination should be to assess the Course Learning Outcomes (CLO) that will ultimately lead to of attainment of Program Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).
2	There shall be continuous evaluation of the student.

Program Structure – Diploma in Engineering

A. Introduction:

Diploma in Engineering is a backbone of all innovation to build the nation, by imparting quality skill development and training in emerging field. It achieve excellence in innovation simultaneously respond to the demand of the society by engaging in lifelong learning and earning. They usually involve in analyzing and providing solutions to real life situations.

Diploma in Engineering program has evergreen scope as it gives enormous job opportunities from local to international companies and secures life-long career. Today no technical innovation is possiblewithout the help of core branches of Diploma in Engineering i.e. Civil, Computer, Electronics, Electrical and Mechanical. Curriculum for Diploma in engineering degree trains the students to work in the vast range of Engineering sectors. To develop understanding of scientific principles and analytical ability, its curriculum starts with courses in basic sciences. These are followed by courses in engineering sciences to offer a smooth transition from basic sciences to professional Diploma in Engineering courses. Teaching of subjects in Basic Sciences and Humanities incorporated to develop appreciation of the impact and scope of science and technology on society. Attention is also paid to develop communication skills in English language. In addition, the program consisted of six semesters not only includes teaching of core courses but also includes program elective, field work/project, value added and open elective courses. The University strives to cultivate among its students a strong desire and capacity for continuous learning as well as self-appraisal to develop sterling human & professional qualities and a strong sense of service to society through designed, curricular, co-curricular activities and congenial campus environment.

After completing their Diploma in Engineering, students hold lucrative opportunities in many renowned industries, some launch their own start-ups, while some appears for B. Tech. to pursue higher studies in the chosen specializations. Diploma in Engineering holders will have ample opportunities in industries like Telecommunication, Automobile and Electronics equipment manufacturing, production, construction in real states etc. It has application right from manufacturing plants, vehicles, ships, robots, heating and cooling systems, aircrafts, even in medical devices. Mechanical engineers are generally hired by manufacturing industries, defense, PWD and Telegraphs etc. Electronic and electrical engineers have opportunities in many industries, with the main areas being in electronics, IT, manufacturing, power, transport, construction, telecommunications, research and development, and petrochemicals. Civil engineers have abundant chances in construction of new set up and building in real state.

Each branch specific in Diploma in Engineering not only provides the environment of solutions to the problems faced by human being but also facilitates the universe with advance technology. Diploma in Engineering demands creativity, technical, analytical and problem solving skills as whole sole interest to soar high in this career. Engineers are considered as creator and innovator of advancements in future. So be the part of Diploma in engineering society and be the creator and innovator!!!

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

Diploma :Three-Years(6-Semester) CBCS Program			
Basic Structure: Distribution of Courses			
S. No.	Type of Course	Credit Hours	Total Credits
1	Core Course(CC)	10Courses of 4 Credit each(Total Credit10X4=40)7Coursesof 1Credit each(Total Credit 7X1=7) 2Coursesof 2Crediteach(Total Credit 2X2=4)	51
2	Discipline Specific Course(DSC)	9 Courses of 4 Credits each(Total Credit9X4=36) 5Coursesof 1Crediteach(Total Credit 5X1=5) 4Coursesof 2Credit each(Total Credit 4X2=8)	49
3	Ability-Enhancement Compulsory Course (AECC)	2 Courses of 4 Credit each (Total Credit 2X4=8) 2 Courses of 2 Credit each (Total Credit 2X2=4)	12
4	Discipline Specified Elective Course(DSEC)	1 Course of 4 Credit each(Total Credit 1X4=4) 1 Course of 3 Credit each(Total Credit 1X3=3) 1Courseof 1Crediteach(Total Credit1X1=1)	8
5	Skill Enhancement Course for Industrial training and Major project (SEC)	4 courses of 1 Credit each (Total Credit 4X1=4) 1 Course of 3 Credit each(Total Credit 1X3=3) 2Courseof 8Crediteach(Total Credit 2X8=16) 1Courseof10Crediteach(Total Credit 1X10=10)	33
Total Credits			153

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the Diploma in Electronics program:

Core Course (CC): Core courses of Diploma program will provide a holistic approach to Diploma in Engineering, giving students an overview of the field, a basis to build and specialize upon. These compulsory courses are the strong foundation to establish engineering knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase.

The compulsory/Core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know -while creating a common student experience that can foster deep understanding, develop decision- making ability and contribute to the engineering and community at large.

A wide range of compulsory courses with four credits hours each provides groundwork in the engineering disciplines: Applied Physics, Applied Chemistry, Applied Mathematics, Applied Mechanics, Computer Fundamentals, Internet & MS office, Basic Civil & Electrical Engineering, & Basic of Electronics and

Mechanical Engineering etc. The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various business fields.

Ability Enhancement Compulsory Course (AECC): As per the guidelines of Choice Based Credit System (CBCS) for all Universities, including the private Universities, the Ability Enhancement Compulsory Course (AECC) is a course designed to develop the ability of students in communication (especially English) and other related courses where they might find it difficult to communicate at a higher level in their prospective job at a later stage due to lack of practice and exposure in the language, etc. Students are motivated to learn the theories, fundamentals and tools of communication which can help them develop and sustain in the corporate environment and culture.

These are compulsory course that do not have any choice. Each student of Diploma in engineering program has to compulsorily pass the Environment Studies, Human Values and Professional Ethics and Entrepreneurship course.

Discipline Specified Course (DSC): These are discipline Specific course that do not have any choice and will be of different credits each. Each student of Diploma in engineering program has to compulsorily pass the discipline Specific course.

A wide range of Discipline Specific courses with four credits hours each provides groundwork in the engineering disciplines: Electronic Devices and Circuits, Principle of Communication, Electrical Engineering & Machines, Network Filters & Transmission Lines, Electronic Instruments & Measurement, Communication Systems & some of lab courses related to above specific courses etc.

Skill Enhancement Course (SEC): An Skill Enhancement Course is a credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world.

Discipline Specific Elective Course (DSEC): The discipline specific elective course is chosen to make students specialist or having specialized knowledge of a specific domain. It will be covered in two semesters (V & VI) of Third year of the program relevant to chosen disciplines of compulsory/core courses of the program. The student will have to choose any one elective out of the three DSEC offered by department.

C. Program Outcomes (POs) for Diploma in Engineering

PO – 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO – 2	**Problem analysis & Solving:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO – 3	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
PO – 4	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clean instructions.
PO – 5	**Entrepreneurship:** An Entrepreneurship cut across every sector of human life including the field of engineering, engineering entrepreneurship is the process of harnessing the business opportunities in engineering and turning it into profitable commercially viable innovation.
PO – 6	**Interpersonal skills:** Interpersonal skills involve the ability to communicate and build relationships with others. Effective interpersonal skills can help the students during the job interview process and can have a positive impact on your career advancement.
PO – 7	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO – 8	**Attitude (Individual and team work):** Function effectively as an individual, and as member or leader in diverse teams, and in multidisciplinary settings.
PO – 9	**Technology savvy/usage:** Being technology savvy is essentially one's skill to be smart with technology. This skill reaches far beyond 'understanding' the concepts of how technology works and encompasses the 'utilization' of such modern technology for the purpose of enhancing productivity and efficiency.
PO – 10	**Social Interaction & effective citizenship:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

D. Program Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of three-year **Diplomain Electronics Engineering Program**

PSO1:	Understanding Data Science concepts in IT Industry
PSO2:	Understanding Data Science tools and methods used in IT industry.
PSO3:	Applying the knowledge of programming skills to create applications in the field of Data Science.
PSO4:	Implementing different machine learning algorithms on different data sets.
PSO5:	Developing Big Data solutions for real life scenario.

E. Pedagogy & Unique practices adopted: "Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will **emphasize on experiential learning:**

1. Audio-Visual Based Learning: These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through video lectures. In fact, many teachersgive examples from movies during their discourses. Making students learn few important theoretical concepts through Audio visual Aids is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting *Audio-Visual Based Learning* wherever possible.

2. Field/Live Projects: The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other than their regular classes.

3. Industrial Visits: Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

4. Special Guest Lectures (SGL) & Extra Mural Lectures (EML): Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture- series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

5. Student Development Program (SDP): Harnessing and developing the right talent for the rightindustry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced

excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

*6. **Industry Focused program:*** Establishing collaborations with various industry partners to deliver the program on sharing basis. The specific courses are to be delivered by industry experts to provide practice based insight to the students.

*7. **Special assistance program for slow learners & fast learners:*** There is a provision of identify slow learners; develop the mechanism to correcting knowledge gap through result analysis of various class tests. Extra classes will be arranged for slow learners and facilitate them with required study material. There are some terms of advance topics what learning challenging it will be provided to the fast learners.

*8. **Induction program:*** Every year 3 weeks induction program is organized for 1st year students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.

9. Mentoring scheme: There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.

10. **Competitive exam preparation:** Students are provided with one class in every week for Competitive exams preparation.

11. **Extracurricular Activities:** organizing & participation in extracurricular activities will be mandatory to help students develop confidence & face audience with care.

Diploma in Electronics Engineering (Specialization in Data Sciences)

Diploma – Semester I

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-1	DIP111	Applied Mathematics – I	4	0	0	4	40	60	100
2	CC-2	DIP112/ DIP113	Applied Physics/ Applied Chemistry	4	0	0	4	40	60	100
3	CC-3	DIP104/ DIP105	Basics of Electrical & Civil Engineering / Basics of Electronics & Mechanical Engineering	4	0	0	4	40	60	100
4	CC-4	DIP131/ DIP107	Computer Fundamentals, Internet & MS-Office/ Applied Mechanics	4	0	0	4	40	60	100
5	AECC-1	TGE104	English Communication-I	1	0	2	2	40	60	100
6	CC-5	DIP181/ DIP182	Physics Lab/Chemistry Lab	0	0	2	1	50	50	100
7	CC-6	DIP153/ DIP154	Electrical Engineering Lab / Electronics Engineering Lab	0	0	2	1	50	50	100
8	CC-7	DIP155/ DIP156	Information Technology Lab /Applied Mechanics Lab	0	0	2	1	50	50	100
9	CC-8	DIP187/ DIP188	Workshop Practice / Engineering Drawing	0	0	4	2	50	50	100
Total				**17**	**0**	**12**	**23**	**400**	**500**	**900**

Diploma in Electronics Engineering (Specialization in Data Sciences)

Diploma – Semester II

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-9	DIP201	Applied Mathematics – II	4	0	0	4	40	60	100
2	CC-10	DIP203/ DIP202	Applied Chemistry/ Applied Physics	4	0	0	4	40	60	100
3	CC-11	DIP205/ DIP204	Basics of Electronics &Mechanical Engineering / Basics of Electrical & Civil Engineering	4	0	0	4	40	60	100
4	CC-12	DIP207/ DIP231	Applied Mechanics / Computer Fundamentals, Internet & MS-Office	4	0	0	4	40	60	100
5	AECC-2	TGE204	English Communication-II	1	0	2	2	40	60	100
6	CC-13	DIP252/ DIP251	Chemistry Lab/Physics Lab	0	0	2	1	50	50	100
7	CC-14	DIP254/ DIP253	Electronics Engineering Lab / Electrical Engineering Lab	0	0	2	1	50	50	100
8	CC-15	DIP256/ DIP255	Applied Mechanics Lab / Information Technology Lab	0	0	2	1	50	50	100
9	CC-16	DIP258/ DIP257	Engineering Drawing / Workshop Practice	0	0	4	2	50	50	100
Total				**17**	**0**	**12**	**23**	**400**	**500**	**900**

Diploma in Electronics Engineering (Specialization in Data Sciences)

Diploma-Semester III

S. No.	Category	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-17	DEC301	Digital Electronics	4	0	0	4	40	60	100
2	DSC-1	DEC302	Electronics Devices & Circuits	4	0	0	4	40	60	100
3	DSC-2	DEC303	Principles of Communication Engineering	4	0	0	4	40	60	100
4	DSC-3	DEE305	Electrical Engineering & Machines	4	0	0	4	40	60	100
5	CC-18	DEC351	Digital Electronics Lab	0	0	2	1	50	50	100
6	DSC-4	DEC352	Electronics Devices & Circuits Lab	0	0	2	1	50	50	100
7	DSC-5	DEC353	Principles of Communication Engineering Lab	0	0	2	1	50	50	100
8	DSC-6	DEE355	Electrical Engineering & Machines Lab	0	0	2	1	50	50	100
9	SEC-1	DEC355	Minor Project	0	0	6	3	50	50	100
10	SEC-2	TDC301	Soft Skills for Technical Supervisors	0	0	2	1	50	50	100
11	SEC-3	TDC302	Elementary Arithmetic & Reasoning	0	0	2	1	50	50	100
12	SEC-4	DDGP301	Discipline & General Proficiency	0	0	0	0	100	0	100
	Total			16	0	18	25	610	590	1200

***Additional course VAC-1for Lateral entry students with 10+2/Intermediate background.**

1	VAC-1	DIP359*	Concepts of Information System Lab	0	0	2	0	50	50	100

Diploma in Electronics Engineering (Specialization in Data Sciences)

Diploma-Semester IV

S. No.	Category	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-7	DEC401	Network Filters & Transmission Lines	4	0	0	4	40	60	100
2	AECC-3	DIP403/ DIP308	Environment Studies	4	0	0	4	40	60	100
3	DSC-8	DEC403	Electronic Instruments & Measurement	4	0	0	4	40	60	100
4	DSC-9	DEC404	Communication Systems	4	0	0	4	40	60	100
5	CC-19	DCS407	Computer Network	4	0	0	4	40	60	100
6	DSC-10	DEC451	Network Filters & Transmission Lines Lab	0	0	4	2	50	50	100
7	DSC-11	DEC453	Electronic Instruments & Measurement Lab	0	0	4	2	50	50	100
8	DSC-12	DEC454	Communication Systems Lab	0	0	2	1	50	50	100
9	SEC-5	TDC402	Progressive Algebra & Data Management	0	0	2	1	40	60	100
10	SEC-6	TDC401	Soft Skills for Workplace for Technical Supervisors	0	0	2	1	50	50	100
11	SEC-7	DDGP401	Discipline & General Proficiency	0	0	0	0	100	0	100
	Total			20	0	14	27	540	560	1100

*Student will go for Summer Internship for 6-8 Weeks.

...Electronics Engineering (Specialization in Data Science)

Curriculum

Diploma-Semester V

S.N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-13	DDS 501	Introduction to Data Science	4	0	0	4	40	60	100
2	DSC-14	DDS 502	Introduction of Statistical Methods	4	0	0	4	40	60	100
3	DSC-15	DDS 503	Python programming for Data Science	4	0	0	4	40	60	100
4	AECC-4	DIP505	Human Values & Professional Ethics	4	0	0	4	40	60	100
5	DSEC-1	-	Minor specialization Specific Elective Course – I	4	0	0	4	40	60	100
6	DSEC-2	-	Minor specialization Specific Elective Course – II	3	0	0	3	40	60	100
7	DSC-16	DDS551	Introduction to Statistical Methods using R-Lab	0	0	4	2	50	50	100
8	DSC-17	DDS552	Data Science Lab	0	0	4	2	50	50	100
9	DSC-18	DDS553	Python Programming for Data Science(Lab)	0	0	2	1	50	50	100
10	DSEC-3	-	Minor specialization Specific Elective Lab –I	0	0	2	1	40	60	100
11	SEC-8	DEC555	Industrial Training(Evaluation)	0	0	0	8	50	50	100
12	SEC-9	DDGP501	Discipline & General Proficiency	0	0	0	0	100	0	100
Total				**23**	**0**	**10**	**37**	**590**	**610**	**1200**

Diploma in Electronics Engineering (Specialization in Data Science)
Diploma-Semester-VI

SN	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	SEC-10	DDS 661	Industry Immersion based on minor specialization	90 Days			08	200	200	400
2	SEC-11	DDS 662	Project Work Phase-II	90 Hours			10	250	250	500
3	SEC-12	DDGP601	Discipline&General Proficiency	0	0	0	1	100	0	100
							19	550	450	1000

Diploma in Electronics Engineering (Specialization in Data Science)

ELECTIVECOURSESOFFERED

Minor specialization Specific Elective Course – I
(Student can select any one open elective offered by university)

S.No	Code	Course	L	T	P	Credit
		Semester V (Anyone)				
1	DDS504	Big Data Analytics	4	0	0	4
2	DDS505	Data Mining Techniques	4	0	0	4

Minor specialization Specific Elective Course – II
(Student can select any one open elective offered by university)

1	DDS 506	Data Visualization and Interpretation	3	0	0	3
2	DDS 507	Probabilistic Science for Data Analysis	3	0	0	3

Minor specialization Specific Elective Lab – I
(Student can select any one open elective offered by university)

S.No	Code	Course	L	T	P	Credit
		Semester V(Anyone)				
1	DDS 554	Big Data Analytics (Lab)	0	0	2	1
2	DDS 555	Data Mining Techniques (Lab)	0	0	2	1

Note:			
L-Lecture	T-Tutorial	P-Practical	C-Credits
1L= 1Hour	1T= 1 Hour	1P= 1 Hour	1C= 1HourLorT 1C= 2HourP

Study & Evaluation Scheme

of

Diploma in Electronics Engineering (Specialization in Mobile Technology)

[Applicable w.e.f. Academic Session - 2023-24 till revised]
[As per CBCS guidelines given by UGC]

Accredited with NAAC A Grade
12-B Status from UGC

TEERTHANKER MAHAVEER UNIVERSITY
N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

Study & Evaluation Scheme SUMMARY	
Institute Name	Faculty of Engineering, T.M.U., Moradabad
Program	Diploma in Electronics Engineering (Specialization in Mobile Technology)
Duration	Three Years full time(Six Semesters)
Medium	English/Hindi
Minimum Required Attendance	75%
Credits	
Maximum Credits	153
Minimum Credits Required for Diploma	149

Assessment:

Evaluation	Internal	External	Total
Theory	40	60	100
Practical/ Dissertations/ Project reports/ Viva-Voce	50	50	100

Class Test-1	Class Test-2	Class Test-3	Assignment(s)	Attendan ce & Participation	Total
Best two out of three					
10	10	10	10	10	40

Duration of Examination	External	Internal
	3 Hours	1.5 Hours

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation. (i.e. both internal and external) A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

Question Paper Structure	
1	The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.
2	Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.
3	The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.

IMPORTANT NOTES:	
1	The purpose of examination should be to assess the Course Learning Outcomes (CLO) that will ultimately lead to of attainment of Program Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).
2	There shall be continuous evaluation of the student.

Program Structure – Diploma in Engineering

A. Introduction:

Diploma in Engineering is a backbone of all innovation to build the nation, by imparting quality skill development and training in emerging field. It achieve excellence in innovation simultaneously respond to the demand of the society by engaging in lifelong learning and earning. They usually involve in analyzing and providing solutions to real life situations.

Diploma in Engineering program has evergreen scope as it gives enormous job opportunities from local to international companies and secures life-long career. Today no technical innovation is possiblewithout the help of core branches of Diploma in Engineering i.e. Civil, Computer, Electronics, Electrical and Mechanical. Curriculum for Diploma in engineering degree trains the students to work in the vast range of Engineering sectors. To develop understanding of scientific principles and analytical ability, its curriculum starts with courses in basic sciences. These are followed by courses in engineering sciences to offer a smooth transition from basic sciences to professional Diploma in Engineering courses. Teaching of subjects in Basic Sciences and Humanities incorporated to develop appreciation of the impact and scope of science and technology on society. Attention is also paid to develop communication skills in English language. In addition, the program consisted of six semesters not only includes teaching of core courses but also includes program elective, field work/project, value added and open elective courses. The University strives to cultivate among its students a strong desire and capacity for continuous learning as well as self-appraisal to develop sterling human & professional qualities and a strong sense of service to society through designed, curricular, co-curricular activities and congenial campus environment.

After completing their Diploma in Engineering, students hold lucrative opportunities in many renowned industries, some launch their own start-ups, while some appears for B. Tech. to pursue higher studies in the chosen specializations. Diploma in Engineering holders will have ample opportunities in industries like Telecommunication, Automobile and Electronics equipment manufacturing, production, construction in real states etc. It has application right from manufacturing plants, vehicles, ships, robots, heating and cooling systems, aircrafts, even in medical devices. Mechanical engineers are generally hired by manufacturing industries, defense, PWD and Telegraphs etc. Electronic and electrical engineers have opportunities in many industries, with the main areas being in electronics, IT, manufacturing, power, transport, construction, telecommunications, research and development, and petrochemicals. Civil engineers have abundant chances in construction of new set up and building in real state.

Each branch specific in Diploma in Engineering not only provides the environment of solutions to the problems faced by human being but also facilitates the universe with advance technology. Diploma in Engineering demands creativity, technical, analytical and problem solving skills as whole sole interest to soar high in this career. Engineers are considered as creator and innovator of advancements in future. So be the part of Diploma in engineering society and be the creator and innovator!!!

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

Diploma :Three-Years(6-Semester) CBCS Program			
Basic Structure: Distribution of Courses			
S. No.	Type of Course	Credit Hours	Total Credits
1	Core Course(CC)	10Courses of 4 Credit each(Total Credit10X4=40)7Coursesof 1Credit each(Total Credit 7X1=7) 2Coursesof 2Crediteach(Total Credit 2X2=4)	51
2	Discipline Specific Course(DSC)	9 Courses of 4 Credits each(Total Credit9X4=36) 5Coursesof 1Crediteach(Total Credit 5X1=5) 4Coursesof 2Credit each(Total Credit 4X2=8)	49
3	Ability-Enhancement Compulsory Course (AECC)	2 Courses of 4 Credit each (Total Credit 2X4=8) 2 Courses of 2 Credit each (Total Credit 2X2=4)	12
4	Discipline Specified Elective Course(DSEC)	1 Course of 4 Credit each(Total Credit 1X4=4) 1 Course of 3 Credit each(Total Credit 1X3=3) 1Courseof 1Crediteach(Total Credit1X1=1)	8
5	Skill Enhancement Course for Industrial training and Major project (SEC)	4 courses of 1 Credit each (Total Credit 4X1=4) 1 Course of 3 Credit each(Total Credit 1X3=3) 2Courseof 8Crediteach(Total Credit 2X8=16) 1Courseof10Crediteach(Total Credit 1X10=10)	33
Total Credits			153

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the Diploma in Electronics program:

Core Course (CC): Core courses of Diploma program will provide a holistic approach to Diploma in Engineering, giving students an overview of the field, a basis to build and specialize upon. These compulsory courses are the strong foundation to establish engineering knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase.

The compulsory/Core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know -while creating a common student experience that can foster deep understanding, develop decision- making ability and contribute to the engineering and community at large.

A wide range of compulsory courses with four credits hours each provides groundwork in the engineering disciplines: Applied Physics, Applied Chemistry, Applied Mathematics, Applied Mechanics, Computer Fundamentals, Internet & MS office, Basic Civil & Electrical Engineering, & Basic of Electronics and

Mechanical Engineering etc. The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various business fields.

Ability Enhancement Compulsory Course (AECC): As per the guidelines of Choice Based Credit System (CBCS) for all Universities, including the private Universities, the Ability Enhancement Compulsory Course (AECC) is a course designed to develop the ability of students in communication (especially English) and other related courses where they might find it difficult to communicate at a higher level in their prospective job at a later stage due to lack of practice and exposure in the language, etc. Students are motivated to learn the theories, fundamentals and tools of communication which can help them develop and sustain in the corporate environment and culture.

These are compulsory course that do not have any choice. Each student of Diploma in engineering program has to compulsorily pass the Environment Studies, Human Values and Professional Ethics and Entrepreneurship course.

Discipline Specified Course (DSC): These are discipline Specific course that do not have any choice and will be of different credits each. Each student of Diploma in engineering program has to compulsorily pass the discipline Specific course.

A wide range of Discipline Specific courses with four credits hours each provides groundwork in the engineering disciplines: Electronic Devices and Circuits, Principle of Communication, Electrical Engineering & Machines, Network Filters & Transmission Lines, Electronic Instruments & Measurement, Communication Systems & some of lab courses related to above specific courses etc.

Skill Enhancement Course (SEC): An Skill Enhancement Course is a credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world.

Discipline Specific Elective Course (DSEC): The discipline specific elective course is chosen to make students specialist or having specialized knowledge of a specific domain. It will be covered in two semesters (V & VI) of Third year of the program relevant to chosen disciplines of compulsory/core courses of the program. The student will have to choose any one elective out of the three DSEC offered by department.

C. Program Outcomes (POs) for Diploma in Engineering

PO – 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO – 2	**Problem analysis & Solving:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO – 3	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
PO – 4	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clean instructions.
PO – 5	**Entrepreneurship:** An Entrepreneurship cut across every sector of human life including the field of engineering, engineering entrepreneurship is the process of harnessing the business opportunities in engineering and turning it into profitable commercially viable innovation.
PO – 6	**Interpersonal skills:** Interpersonal skills involve the ability to communicate and build relationships with others. Effective interpersonal skills can help the students during the job interview process and can have a positive impact on your career advancement.
PO – 7	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO – 8	**Attitude (Individual and team work):** Function effectively as an individual, and as member or leader in diverse teams, and in multidisciplinary settings.
PO – 9	**Technology savvy/usage:** Being technology savvy is essentially one's skill to be smart with technology. This skill reaches far beyond 'understanding' the concepts of how technology works and encompasses the 'utilization' of such modern technology for the purpose of enhancing productivity and efficiency.
PO – 10	**Social Interaction & effective citizenship:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

D. Program Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of three-year **Diplomain Electronics Engineering Program**

PSO1:	Understanding the concept and applyingthe skills gained from Mathematics, Computing, Science and Social Science.
PSO2:	Design and develop efficient Automation system to enhance the quality of life by applying fundamentals of Basic Science, Mechanical and Mechatronics Engineering
PSO3:	Analyses and improve the performance of Manufacturing and Production system by implementing the Soft and hard Computing methods
PSO4:	Manage and lead a professional or an entrepreneur career in industries by applying modern Engineering, Management principles and best practices
PSO5:	Creating a structure or pattern from diverse elements.

E. Pedagogy & Unique practices adopted: "Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will **emphasize on experiential learning:**

1. Audio-Visual Based Learning: These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through video lectures. In fact, many teachersgive examples from movies during their discourses. Making students learn few important theoretical concepts through Audio visual Aids is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting *Audio-Visual Based Learning* wherever possible.

2. Field/Live Projects: The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other than their regular classes.

3. Industrial Visits: Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

4. Special Guest Lectures (SGL) & Extra Mural Lectures (EML): Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture- series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

5. Student Development Program (SDP): Harnessing and developing the right talent for the rightindustry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced

excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

6. Industry Focused program: Establishing collaborations with various industry partners to deliver the program on sharing basis. The specific courses are to be delivered by industry experts to provide practice based insight to the students.

7. Special assistance program for slow learners & fast learners: There is a provision of identify slow learners; develop the mechanism to correcting knowledge gap through result analysis of various class tests. Extra classes will be arranged for slow learners and facilitate them with required study material. There are some terms of advance topics what learning challenging it will be provided to the fast learners.

8. Induction program: Every year 3 weeks induction program is organized for 1st year students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.

9. **Mentoring scheme:** There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.

10. **Competitive exam preparation:** Students are provided with one class in every week for Competitive exams preparation.

11. **Extracurricular Activities:** organizing & participation in extracurricular activities will be mandatory to help students develop confidence & face audience with care.

Diploma in Electronics Engineering (Specialization in Mobile Technology)

Diploma – Semester I

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-1	DIP111	Applied Mathematics – I	4	0	0	4	40	60	100
2	CC-2	DIP112/ DIP113	Applied Physics/ Applied Chemistry	4	0	0	4	40	60	100
3	CC-3	DIP104/ DIP105	Basics of Electrical & Civil Engineering / Basics of Electronics & Mechanical Engineering	4	0	0	4	40	60	100
4	CC-4	DIP131/ DIP107	Computer Fundamentals, Internet & MS-Office/ Applied Mechanics	4	0	0	4	40	60	100
5	AECC-1	TGE104	English Communication-I	1	0	2	2	40	60	100
6	CC-5	DIP181/ DIP182	Physics Lab/Chemistry Lab	0	0	2	1	50	50	100
7	CC-6	DIP153/ DIP154	Electrical Engineering Lab / Electronics Engineering Lab	0	0	2	1	50	50	100
8	CC-7	DIP155/ DIP156	Information Technology Lab /Applied Mechanics Lab	0	0	2	1	50	50	100
9	CC-8	DIP187/ DIP188	Workshop Practice / Engineering Drawing	0	0	4	2	50	50	100
Total				17	0	12	23	400	500	900

Diploma in Electronics Engineering (Specialization in Mobile Technology)

Diploma – Semester II

S. N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-9	DIP201	Applied Mathematics – II	4	0	0	4	40	60	100
2	CC-10	DIP203/ DIP202	Applied Chemistry/ Applied Physics	4	0	0	4	40	60	100
3	CC-11	DIP205/ DIP204	Basics of Electronics &Mechanical Engineering / Basics of Electrical & Civil Engineering	4	0	0	4	40	60	100
4	CC-12	DIP207/ DIP231	Applied Mechanics / Computer Fundamentals, Internet & MS-Office	4	0	0	4	40	60	100
5	AECC-2	TGE204	English Communication-II	1	0	2	2	40	60	100
6	CC-13	DIP252/ DIP251	Chemistry Lab/Physics Lab	0	0	2	1	50	50	100
7	CC-14	DIP254/ DIP253	Electronics Engineering Lab / Electrical Engineering Lab	0	0	2	1	50	50	100
8	CC-15	DIP256/ DIP255	Applied Mechanics Lab / Information Technology Lab	0	0	2	1	50	50	100
9	CC-16	DIP258/ DIP257	Engineering Drawing / Workshop Practice	0	0	4	2	50	50	100
Total				**17**	**0**	**12**	**23**	**400**	**500**	**900**

Diploma in Electronics Engineering (Specialization in Mobile Technology)

Diploma-Semester III

S. No.	Category	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-17	DEC301	Digital Electronics	4	0	0	4	40	60	100
2	DSC-1	DEC302	Electronics Devices & Circuits	4	0	0	4	40	60	100
3	DSC-2	DEC303	Principles of Communication Engineering	4	0	0	4	40	60	100
4	DSC-3	DEE305	Electrical Engineering & Machines	4	0	0	4	40	60	100
5	CC-18	DEC351	Digital Electronics Lab	0	0	2	1	50	50	100
6	DSC-4	DEC352	Electronics Devices & Circuits Lab	0	0	2	1	50	50	100
7	DSC-5	DEC353	Principles of Communication Engineering Lab	0	0	2	1	50	50	100
8	DSC-6	DEE355	Electrical Engineering & Machines Lab	0	0	2	1	50	50	100
9	SEC-1	DEC355	Minor Project	0	0	6	3	50	50	100
10	SEC-2	TDC301	Soft Skills for Technical Supervisors	0	0	2	1	50	50	100
11	SEC-3	TDC302	Elementary Arithmetic & Reasoning	0	0	2	1	50	50	100
12	SEC-4	DDGP301	Discipline & General Proficiency	0	0	0	0	100	0	100
	Total			16	0	18	25	610	590	1200

***Additional course VAC-1for Lateral entry students with 10+2/Intermediate background.**

1	VAC-1	DIP359*	Concepts of Information System Lab	0	0	2	0	50	50	100

Diploma in Electronics Engineering (Specialization in Mobile Technology)

Diploma-Semester IV

S. No.	Category	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-7	DEC401	Network Filters & Transmission Lines	4	0	0	4	40	60	100
2	AECC-3	DIP403/ DIP308	Environment Studies	4	0	0	4	40	60	100
3	DSC-8	DEC403	Electronic Instruments & Measurement	4	0	0	4	40	60	100
4	DSC-9	DEC404	Communication Systems	4	0	0	4	40	60	100
5	CC-19	DCS407	Computer Network	4	0	0	4	40	60	100
6	DSC-10	DEC451	Network Filters & Transmission Lines Lab	0	0	4	2	50	50	100
7	DSC-11	DEC453	Electronic Instruments & Measurement Lab	0	0	4	2	50	50	100
8	DSC-12	DEC454	Communication Systems Lab	0	0	2	1	50	50	100
9	SEC-5	TDC402	Progressive Algebra & Data Management	0	0	2	1	40	60	100
10	SEC-6	TDC401	Soft Skills for Workplace for Technical Supervisors	0	0	2	1	50	50	100
11	SEC-7	DDGP401	Discipline & General Proficiency	0	0	0	0	100	0	100
	Total			20	0	14	27	540	560	1100

*Student will go for Summer Internship for 6-8 Weeks.

Diploma in Electronics Engineering (Specialization in Mobile Technology)

Diploma-Semester V

S.N	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	DSC-13	DMT501	Introduction to cellular communication	4	0	0	4	40	60	100
2	DSC-14	DEC502	Optical Fiber& Communication	4	0	0	4	40	60	100
3	DSC-15	DEC503	Industrial Electronics & Transducers	4	0	0	4	40	60	100
4	AECC-4	DIP505	Human Values & Professional Ethics	4	0	0	4	40	60	100
5	DSEC-1	-	Minor specialization Specific Elective Course – I	4	0	0	4	40	60	100
6	DSEC-2	-	Minor specialization Specific Elective Course – II	3	0	0	3	40	60	100
7	DSC-16	DMT556	Programming in C (Lab)	0	0	4	2	50	50	100
8	DSC-17	DEC556	Optical Fiber & Communication Lab	0	0	4	2	50	50	100
9	DSC-18	DEC553	Industrial Electronics & Transducer Lab	0	0	2	1	50	50	100
10	DSEC-3	DMT552	Minor specialization Specific Elective Lab – I	0	0	2	1	50	50	100
11	SEC-8	DEC555	Industrial Training (Evaluation)	0	0	0	8	50	50	100
12	SEC-9	DDGP501	Discipline & General Proficiency	0	0	0	0	100	0	100
Total				**23**	**0**	**12**	**37**	**590**	**610**	**1200**

Diploma in Electronics Engineering (Specialization in Mobile Technology)

Diploma-Semester-VI

S.N	Category	Course Code	Course	Periods			Credit	EvaluationScheme		
				L	T	P		Internal	External	Total
1	SEC-10	DMT661	Industry Immersion based on minor specialization	90 Days			08	200	200	400
2	SEC-11	DMT662	Project Work Phase-I	90 Days			10	250	250	500
3	SEC-12	DDGP601	Discipline & General Proficiency	0	0	0	0	100	0	100
Total							18	550	450	1000

Diploma in Electronics Engineering (Specialization in Mobile Technology)

Curriculum

ELECTIVECOURSESOFFERED

Minor specialization Specific Elective Course – I
(Student can select any one open elective offered by university)

S.No	Code	Course	L	T	P	Credit
		SemesterV(Anyone)				
1	DMT502	Data communication network	4	0	0	4
2	DMT503	Mobile application development	4	0	0	4
		Minor specialization Specific Elective Course – II (Student can select any one open elective offered by university)				
1	DMT504	Cloud computing	3	0	0	3
2	DMT505	Mobile computing	3	0	0	3

Minor specialization Specific Elective Lab – I
(Student can select any one open elective offered by university)

S.No	Code	Course	L	T	P	Credit
		SemesterV(Anyone)				
1	DMT552	Practical based on Android	0	0	2	1
2	DMT553	Practical based on Android App Development	0	0	2	1

Note:			
L-Lecture	T-Tutorial	P-Practical	C-Credits
1L= 1Hour	1T= 1 Hour	1P= 1 Hour	1C= 1HourLorT 1C= 2HourP