

Course Curriculum (in line of NEP 2020) for Diploma
In
Electronics and Telecommunication Engineering (Draft)
(For students admitted in 2024-25 onwards)

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Inclusion of National Education Policy, 2020:

As envisioned in the NEP 2020 the State Council for Technical Education, Assam will be responsible for mentoring its affiliated Polytechnics so that they develop capabilities and achieve minimum benchmarks in academic and curricular matters, teaching and assessment.

State Council for Technical Education (SCTE), Assam will notify the pool of MOOCs courses duly approved by its statutory bodies and map them in Academic Bank of Credits (ABC). Affiliated Polytechnics may opt for any of these courses as required. State Council for Technical Education (SCTE) will take suitable action for preparation of syllabus for these courses including learning objective and learning outcome.

The State Council for Technical Education (SCTE) may fix the minimum number of credits to be earned by the students from a parent institution.

All the affiliating institutions will complete Academic Bank of Credits registration through SCTE. Institute will monitor the opening of ABC account by all the students.

Salient features

Salient features that are to be considered for developing the curriculum aligned to NEP 2020 are as follows:

- Reduced number of credits.
- Introduction of Student Induction Program.
- Well defined learning objectives & outcomes for each course.
- Inclusion of courses on socially relevant topics.
- Built-in flexibility to the students in terms of professional elective and open Elective courses.
- Mandatory internship to equip the students with practical knowledge and provide them exposure to real time industrial environments.
- Virtual Labs.
- Mapping of Courses to its equivalent NPTEL/SWAYAM Course.
- Course on 'Entrepreneurship and Startups' to encourage entrepreneurial mindset.
- Introduction of Design Thinking and Universal Human Value course.

Basic Guidelines:

The existing Credit System is revised as Choice Based Credit System (CBCS) in line with NEP guidelines, to infuse innovation and flexibility. No hard separation between streams, between curricular and extra-curricular, between Vocational and Academic, Multidisciplinary and holistic education across the disciplines, Ethics and Human & Constitutional values, Life skills, use of technology as part of all curriculum.

- An academic year is divided into two semesters as per AICTE guidelines.
- A semester consists of approximately 90 working days. One working week will have approximately 40 hours of instructional time.
- There shall also be a Winter Internship Program for duration of 4 weeks/one month from 1st January to -31st January.
- Summer term courses may be offered on a fast-track mode to enable students to complete arrears/special courses.
- Teachers may avail semester end vacations after the end of each semester. Subject to completion all kinds of examination related work.
- The Polytechnics under the Directorate of Technical Education can decide on the kind of courses to be offered in the summer term, based on the requirements and also based on the availability of teaching faculty.
- Internship/apprenticeship can be carried out during the winter term, mandatorily for regular student.

- Students who wish to exit after 1st year or 2nd year of study, have to undergo mandatory bridge courses as defined in the course structure.

Induction Program:

The Essence and Details of Induction program can be find from the 'Detailed Guide on Student Induction program', as available on AICTE Portal,

(Link: <https://www.aicteindia.org/sites/default/files/Detailed%20Guide%20on%20Student%20Induction%20program.pdf>),

The Induction program for students to be offered right at the start of the first year for three-week duration.

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas

Mandatory Visits/ Workshop/Expert Lectures:

- a) It is mandatory to arrange one industrial visit every semester for the students of each branch.
- b) It is mandatory to conduct a One-week workshop during the winter break after fifth semester on professional/ industry/ entrepreneurial orientation.
- c) It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry.

GENERAL COURSE STRUCTURE & CREDIT DISTRIBUTION

Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hours Practical (P) per week	1 credit

A. Range of Credits:

In the light of the fact that a typical Model Four-year Under Graduate degree program in Engineering has about 160 credits, the total number of credits proposed for the three-year Diploma program in Engineering & Technology is 120.

B. Structure of Diploma Engineering program:

The structure of Diploma Engineering program shall have essentially the following categories of courses with the breakup of credits as given:

Sr. No.	Category	Suggested Breakup of Credits
1.	Humanities & Social Sciences courses	8*
2.	Basic Science courses	19*
3.	Engineering Science courses	15*
4.	Program Core courses (Branch specific)	45*
5.	Program Elective courses (Branch specific)	12*
6.	Open Elective courses (from other technical and /or emerging subjects)	9*
7.	Project work, seminar and internship in industry or elsewhere	12*
8.	Audit Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge etc.]	(non-credit)
	Total	120*

**Minor variation is allowed as per need of the respective disciplines.*

C. Course code and definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
HS	Humanities & Social Sciences Courses
BS	Basic Science Courses
ES	Engineering Science Courses
PC	Program Core Courses
PE	Program Elective Courses
OE	Open Elective Courses
AU	Audit Courses
SI	Summer Internship
PR	Project
SE	Seminar

D. Course level coding scheme:

Three-digit number (odd numbers are for the odd semester courses and even numbers are for even semester courses) used as suffix with the Course Code for identifying the level of the course e.g.

101, 102 ... etc. for first year

201, 202 Etc. for second year

301, 302 ... for third year

E. Evaluation Scheme for 3rd Semester of Diploma in Engineering courses under State Council for Technical Education (SCTE), Assam

For Theory Courses:

(The weightage of Internal assessment is 40% and for End Semester Exam is 60%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

For Practical Courses:

(The weightage of Internal assessment is 60% and for End Semester Exam is 40%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

For Summer Internship / Projects / Seminar etc.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

Note: The internal assessment is based on the student's performance in mid semester tests (two best out of three), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc.

F. Mapping of Marks to Grades

Each course (Theory/Practical) is to be assigned 100 marks, irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

Range of Marks	Assigned Grade	Grade Point
91-100	A ⁺	10
81-90	A	9
71-80	B ⁺	8
61-70	B	7
51-60	C ⁺	6
46-50	C	5
40-45	D	4
< 40	F (Fail due to less marks)	-
-	F ^R (Fail due to shortage of attendance and therefore, to repeat the course)	-

A. Credit Distribution, Mark Distribution and Break up of Internal Assessment Marks as per following table:

A. Semester wise Credit point distribution

SL. NO	SEMESTER	CREDIT POINTS
1	THIRD	20
2	FOURTH	20
3	FIFTH	20
4	SIX	20
TOTAL CREDIT POINTS		80

1.1 Subject Category wise Credit point Distribution

COURSE CATEGORY	SEM III	SEM IV	SEM V	SEM VI	TOTAL CREDIT POINT
Programme Core Courses	18	12	10	8	48
Programme Elective Courses	0	2	6	0	08
Open Elective Courses	2	2	2	2	08
Audit Courses	0	0	0	0	00
Semester Internship	0	2	0	2	04
PROJECT and Seminar	0	2	2	5	09
HSC	0	0	0	3	03
TOTAL CREDIT	20	20	20	20	80

Course Structure:

THIRD SEMESTER						
SL.NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETPC-301	Digital Electronics	3	0	0	3
2	ETPC-302	Analog Electronics - I	3	0	0	3
3	ETPC-303	Communication Engineering-I	3	0	0	3
4	ETPC-304	Electronic Measurements and Instrumentation	3	0	0	3
5	ETPC-305	Electronic Workshop	0	1	4	3
6	ETPC-306	Digital Electronics Lab	0	0	2	1
7	ETPC-307	Analog Electronics – I Lab	0	0	2	1
8	ETPC-308	Communication Engineering-I Lab	0	0	2	1
9	OE-301	Engineering Economics & Accountancy	2	0	0	2
10	OE-302	Mathematics-III	2	0	0	2
11	OE-303	Computer Programming Language	1	0	2	2
12	OE-304	Fundamentals of Innovation & Design Thinking (Tata)	1	0	2	2
13	AU-01	Essence of Indian knowledge and Tradition	2	0	0	-

***NOTE:- Choose any one subject code OE-301, OE-302, OE-303 and OE-304**

Marks Distribution (3rd Semester):

S. No.	Course Code	Course Title	Internal Assessment (Theory)		ESE		Internal Assessment (Practical)		Practical Test		Total Marks (Course)	Pass Marks (Course)
			Total Marks	Pass Marks	Total Marks	Pass Marks	Total Marks	Pass Marks	Total Marks	Pass Marks		
1	ETPC-301	Digital Electronics	40	16	60	24	-	-	-	-	100	40
2	ETPC-302	Analog Electronics - I	40	16	60	24	-	-	-	-	100	40
3	ETPC-303	Communication Engineering-I	40	16	60	24	-	-	-	-	100	40
4	ETPC-304	Electronic Measurements and Instrumentation	40	16	60	24	-	-	-	-	100	40
5	ETPC-305	Electronic Workshop	-	-	-	-	120	48	80	32	200	80
6	ETPC-306	Digital Electronics Lab	-	-	-	-	60	24	40	16	100	40
7	ETPC-307	Analog Electronics – I Lab	-	-	-	-	60	24	40	16	100	40
8	ETPC-308	Communication Engineering-I Lab	-	-	-	-	60	24	40	16	100	40
9	OE-301	Engineering Economics & Accountancy	40	16	60	24	-	-	-	-	100	40
10	OE-302	Mathematics-III	40	16	60	24	-	-	-	-	100	40
11	OE-303	Computer Programming Language	20	08	30	12	30	12	20	08	100	40
12	OE-304	Fundamentals of Innovation & Design Thinking (Tata)										
13	AU-01	Essence of Indian knowledge and Tradition	40	16	60	24	-	-	-	-	100	40
Total											1000	

N.B: The marks of Audit Course is not included in total marks.

a) Break Up of Internal Assessment Marks

Internal Assessment for Theory (TA+HA&CT)

Component	Teacher's Assessment (TA)			Home Assignment & Class Test (HA&CT)				Total
	Attendance	Discipline	Class Participation	Home Assignment	Presentation / Seminar	Quiz	Class Test	
Maximum Marks	5	1	2	4	6	2	20	40

Note: Three (3) class tests must be conducted for each course. For calculation of Internal Assessment, best two (2) class tests out of the three (3) conducted is to be considered.

Internal Assessment for Practical (PA)

For 60 marks

Component	Maximum Marks
Teacher's Assessment (TA)	
Attendance	10
Discipline	2
Practical Assignment	
Practical Work and/or Laboratory Report	30
Presentation	10
Viva	8
Total	60

b) Grading System proposed is Absolute Grading System.

c) Conversion factor from Cumulative Grade Point Average (CGPA) to Percentage (%) is 10.

Range of Attendance with Marks (for Theory):

Sl No.	Range of Attendance	Marks
1	96% and above	5 Mark
2	91% to 95%	4 Mark
3	86% to 90%	3 Mark
4	81% to 85%	2 Mark
5	76% to 80%	1 Mark
6	75%	Only permitted to appear in the exam
7	Between 60% to 75%	NC: May appear in the exam if there are genuine reasons
8	Below 60%	DC: Cannot appear in the exam

Range of Attendance with Marks (for Practical):

Sl No.	Range of Attendance	Marks
1	96% and above	10 Mark
2	91% to 95%	9 Mark
3	86% to 90%	8 Mark
4	81% to 85%	7 Mark
5	76% to 80%	5 Mark
6	75%	Only permitted to appear in the exam
7	Between 60% to 75%	NC: May appear in the exam if there are genuine reasons
8	Below 60%	DC: Cannot appear in the exam

Valid Ground for Non-collegiate students:

1. Medical grounds.
2. Participation in a state/national level competition, including the journey period as approved by the Head of Institution.
3. Participation in a seminar of national/international level, workshop or conference, including the journey period as approved by the Head of Institution.
4. Participation in voluntary programmes conducted by the Institute/Directorate as per Government notification.
5. Any other grounds which the Examination Committee, in consultation with the Secretary, SCTE may approve.

Current Examination Fee structure:

- Non Collegiate Fees: Rs. 300/- (per subject)
- Examination Fee: Rs. 500/-
- Retest Fee: Rs. 200/- (per subject)

N.B: The rates may be changed subject to Government order.

Conditions for Dis-Collegiate (DC) student:

- (i) Any candidate who is an internal student but has attended less than 60% of classes in any one or more subjects on theory and/ or practical shall not be eligible to appear in the respective semester examination and termed as Dis-collegiate student.
- (ii) Dis-collegiate students will have to repeat the semester by taking admission in the next session.

Note: The above guidelines may be changed/modified as per AICTE and Government of Assam notification from time to time.

**Detailed Third Semester
Curriculum Contents
(Electronics and Telecommunication
Engineering Branch)**

1. Course Title: Digital Electronics

Course Code :	ET-301
Course Title :	Digital Electronics
Number of Credits :	3 (L: 3, T: 0)
Prerequisites :	NIL
Course Category :	ET

Aim:

To equip students with fundamental knowledge of digital electronic concepts, digital communication, necessary parts, and circuit analysis methods so they can comprehend and know how basic systems work and get ready for more complex engineering course work.

Course Objectives:

- To give students a foundational understanding of the various electronic engineering and digital engineering concepts and elements,
- To provide information on about digital communication, microprocessor and computer knowledge, digital signals, digital electronics, and their uses,
- To apply them in navigating the principles and applications of digital engineering in various industrial processes.

COURSE OUTCOME (CO):

On completion of the course, the student will be able to understand:

- CO-1: To interpret logic functions, circuits, truth tables, and Boolean algebra expressions.
- CO-2: To apply the laws of Boolean algebra to simplify circuits for a cost effective solution.
- CO-3: To understand, analyze and design various combinational and sequential circuits.
- CO-4: To learn about various types of flip-flops and their functions.
- CO-5 : To understand the use of registers and counters.
- CO-6 : To become familiar with memory devices to properly incorporate into a circuit design.
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Course Content:

ETC ENGINEERING			
Chapter No.	Chapter Title	Course Content	Duration Hours
1.0	Logic gates.	1.1 Logic levels, positive and negative logic. 1.2 Concept of basic Logics & their definition; Logic gates: truth table of OR, AND, NOT, NOR, NAND, X-OR, X-NOR Gates. 1.3. Universal logic gates, Tristate gates, buffers. 1.4 Logic families: RTL, DTL, TTL, ECL and CMOS. 1.5 Classification and characteristics of Digital IC's, TTL and CMOS –Series, their comparison. 1.6 IC gates: Quad NAND (7400), Quad NOR (7402), Hex-Inverter (7404), Tristate Buffer (74125,6882).	08
2.0	Boolean Algebra	2.1. Principles of Boolean Algebra: Definition of Boolean constant, variable and function, the rule of Boolean Algebra, De-Morgan's theorem, analysis of the operation of Logic gates, Realization of Boolean expression with logic gates. 2.2 Simplification of compound Boolean expression: Algebraic and K-Map method of simplification, don't care condition.	08
3.0	Combinational Logic Systems	3.1. Binary Adders & Sub tractors : Half Adder, Full Adder, Half Sub tractor, Full Sub tractor. 3.2. Digital Comparator, Parity checker/Generator, Error code. 3.3. Decoder/De-multiplexer, Data selector/Multiplexer, Encoder.	08

		3.4. Seven segment display, BCD to seven-segment decoder (7447). 3.5. IC Comparator (7485), IC Decoder (74138), IC Multiplexer (74151)	
4.0	Flip-flops	4.1. Flip-flops: latch a 1-bit memory cell, S-R flip-flop, Concept of clock, Preset and clear. 4.2. J-k flip flop, Race around condition, Master-Slave J-k, D-type, T-type flip flops. 4.3. Dual-JK (7474), Hex D flip-flop (74174)	06
5.0	Registers and Counters	5.1. Shift Register: Serial in Serial out (SISO), Serial in Parallel out (SIPO), Parallel in Serial out (PISO), Parallel in Parallel out (PIPO) mode. 5.2. Counters: synchronous, asynchronous counter, Ripple Counter, Ring counter, Up/Down counter, Decade Counter. 5.3. IC Shift Register (74194), IC Ripple Counter (74293), Decade Counter (74290)	06
6.0	Memory Devices	6.1. Introduction: Classification and Characteristics of memories 6.2. Structure and application of memories. 6.3. Memory Expansion and organization. 6.4. Various memory ICs.	06
7.0	Class test		03

Distribution of Marks/Table of specifications:**Table of specification for theory:**

Sl. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	T
1	Logic gates.	8	18	8	4	12
2	Boolean Algebra	8	18	6	6	12
3	Combinational Logic Systems	8	18	6	6	12
4	Flip-flops	6	13	4	4	8
5	Registers and Counters	6	13	4	4	8
6	Memory Devices	6	13	5	3	8
7	Class test	3	7	-	-	-
	Total	45	100	33	27	60

K = Knowledge C=Comprehension A
= Application
HA= Higher Than Application (Analysis, Synthesis, Evaluation)
T = Total

Details Table of Specification for Theory:

Sl. No	Topic (a)	Objective Type			Short Answer Type			Long Answer Type		
		K	C	T	K	C	T	K	C	T
1	Logic gates.	4	2	4	2	2	4	2	-	4
2	Boolean Algebra	3	-	3	1	-	3	2	6	6
3	Combinational Logic Systems	2	-	2	2	-	4	2	6	6
4	Flip-flops	-	2	2	-	2	2	4	-	4
5	Registers and Counters	2	-	2	1	1	3	1	3	3

6	Memory Devices	2	-	4	2	-	7	1	3	4
	Total	13	4	17	8	5	15	12	18	27

K = Knowledge C=Comprehension A
= Application
T=Total

Suggested Implementation Strategies:-

Teacher will use Black board, OHP, LCD Projector, Smart board, Video etc for effective teaching learning process.

N.B.:-1.The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill up

the blanks, write in one sentence and match the following type.

Suggested Books:

1. Modern Digital Electronics—R P Jain
2. Digital Principles & Application—Malvino & Leach
3. Digital System-Ronald Tocci
4. Digital Fundamentals- Thomas L. Floyd

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6. Course Title: Digital Electronics Lab

Course Code	ET-301
Course Title	Digital Electronics Lab
Number of Credits	1(L:1 ,T:0)
Prerequisites	NIL
Course Category	ET

Learning Objective: The main objectives are:

- (i) To provide an experimental foundation for the theoretical concepts introduced in theory classes.
- (ii) Demonstrate the principles taught in the classes.

Course (Practical) Outcomes:

After successful completion of this course students will able to

CO1: Identify and use different digital electronics instruments

CO2: Apply and examine the theoretical knowledge to perform basic digital electronics experiments

EXPERIMENTS OF DIGITAL ELECTRONICS LAB:

Sl No.	Name of Experiments	Approx. Hrs.	COs
1	Realization of basic gates	02	CO1, CO2
2	Experiments on Flip Flops	02	CO1, CO2
3	Experiments on Registers & Counters	02	CO1, CO2
4	Experiment on Adder/Subtractor	02	CO1, CO2
5	Experiments on Multiplexer/Demultiplexer	02	CO1
6	Experiment on Decoder/Encoder	02	CO1, CO2
7	Experiment on Seven Segment Display	02	CO1
8	Experiment on Digital to Analog Converter	02	CO1, CO2
9	Experiment on Analog to Digital Converter	02	CO1, CO2
10	Experiment on Memory ICs.	02	CO1, CO2

2.Course Title: Analog Electronics - I

Course Code	:	ETPC-302
Course Title	:	Analog Electronics - I
Number of Credits	:	3(L: 3,T:0,P:0)
Prerequisites	:	NIL
Course Category	:	ETPC

Aim:

This is the fundamental subject of every electronic engineers. This is one of the core group subjects of Electronics and Telecommunication Engineering. By studying this subject, students will gather fundamental knowledge of Analog electronic devices. Concept on analog electronics will pave easy way to understand operations and functioning of most of the present day electronic gadgets.

Course Objectives:

- To give students a foundational understanding of the Electronic components and circuits.
- To provide Concept on analog electronic components, understand operations and functioning of these components and their uses,
- To assist them in navigating the principles and applications of semiconductor devices engineering in various industrial processes.

COURSE OUTCOME(CO) :

On completion of the course, the student will be able to:

CO1: Explain the behaviour of semiconductor devices.

CO2: Analyze the performance of rectifier circuits, filters and voltage multipliers.

CO3: Explain the biasing techniques for BJTs.

CO4: Describe the construction, working, and characteristics of JFET, MOSFET, and UJT, and differentiate them from BJT based on operation and parameters.

CO5: Explain single stage and multistage amplifier circuit and classify Power amplifier circuits.

Detail Course Content:

Analog Electronics - I (ETPC-302)			
Ch. No.	Chapter Title	Course Content	Durati on Hours
1.	Semiconductor Devices	1.1Electricalpropertiesofsemiconductor materials, Energy level diagrams of conductor, semiconductor and Insulator. 1.2 Formation of P-Type and N-Type materials and their properties. Formation and behavior of PN junction diode. 1.3 Zener diode, Zener breakdown & Avalanche Breakdown.	9

		Varactor diode, Schottky diode. 1.4 Diode wave shaping circuits – clipper and clamper circuits 1.5 Opto-electronic devices-LDR, LED, LCD, photovoltaic cell, solar cells, their construction, operation and applications.	
2	Rectifier and Power Supply	2.1 Half Wave and Full-Wave Rectifiers: Average voltage–R.M.S. voltage, efficiency and ripple factor, Percentage voltage regulation 2.2 Function of filter circuits, Capacitor input filter, Inductive filter. 2.3 Voltage Multiplier: Voltage	4
3	Bipolar Junction Transistor	3.1 Formation and properties of PNP and NPN Transistor 3.2 Transistor configurations, input and output characteristics α , β and γ factors 3.3 Comparison of CB, CE and CC configurations	4
4	Transistor Biasing	4.1 AC and DC load-lines Concept of Q-point, 4.2 Stabilization and stability factor 4.3 Biasing: Base bias—Collector feedback bias— Emitter feedback bias, Potential divider bias. 4.4 Bias compensation circuits	5
5	JFET, MOSFET And UJT	5.1 Difference between BJT, FET and MOSFET 5.2 Symbol and basic structure, Basic operation, VI characteristics and biasing of JFET, MOSFET– depletion and enhancement modes. 5.3 Relation among drain resistance, amplification Factor and mutual conductance 5.4 Basic structure and Basic operation, VI characteristics of UJT, Application of UJT	6
6	Single Stage Transistor Amplifiers	6.1 Concept of amplification, classification criteria of Amplifiers and their classifications 6.2 CB, CE and CB amplifiers, their characteristics, comparison and uses. 6.3 JFET amplifiers—Common Source JFET amplifiers, working, advantages and uses.	5
7	Multistage Amplifier	7.1 RC coupled – Direct coupled –Transformer Coupled amplifiers– 7.2 Effect on Gain & Bandwidth and Frequency response for cascading 7.3 Comparison of different types of cascading	4
8	Power Amplifier	8.1 Characteristics of Class A, Class B, Class C and Class AB amplifier 8.2 Difference between Voltage and Power Amplifier 8.3 Transformer Coupled Class A Power Amplifier: Circuit operation 8.4 Class B Push Pull Amplifier : Circuit operation, Cross over distortion—Advantages and disadvantages – Complementary symmetry and quasicomplementary symmetry Class B Push Pull Amplifier 8.5 Noise in amplifier circuits	5

Suggested Books:

- Principles of Electronics- VK Mehta
- Basic Electronics (Solid state)—B L Theraja
- Electronic Principles- Malvino
- Electronic Devices and Circuits- David A. Bell
- Electronics Devices and circuits-Anil K. Maini
- Electronic Devices and Circuits-S. Salivahanan
- Electronic Devices and Circuits—Milman & Halkias

- h) Electronic Devices and Circuits–Allen Mottershead
i) Integrated Electronics- Millman & Halkias

Distribution of Marks/Table of specifications

TABLE OF SPECIFICATIONS FOR THEORY

Sl. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	T
1	Semiconductor Devices	9	20	10	2	12
2	Rectifier and Power Supply	4	9	2	3	5
3	Bipolar Junction Transistor	4	9	7	6	13
4	Transistor Biasing	5	11	2	5	7
5	JFET, MOSFET AND UJT	6	13	2	4	6
6	Single Stage Transistor Amplifiers	5	11	3	3	6
7	Multistage Amplifier	4	9	3	3	6
8	Power Amplifier	5	11	1	4	5
9	Class test	3	7	-	-	-
	Total	45	100	41	19	60

K = Knowledge

C=Comprehension

A = Application

HA=Higher Than Application (Analysis,Synthesis,Evaluation)

Marks Distribution:

Details Table of Specification for Theory

Sr. No	Topic (a)	ObjectiveType			ShortAnswerType			LongAnswer Type		
		K	C	T	K	C	T	K	C	T
1	Semiconductor Devices	3	-	3	3	2	5	4	-	4
2	Rectifier and Power Supply	2	-	2	-	-	-	-	3	3
3	Bipolar Junction Transistor	3	-	3	4	2	6	-	4	4
4	Transistor Biasing	2	-	2	-	2	2	-	3	3
5	JFET, MOSFET AND UJT	2	-	2	-	2	2	-	2	2
6	Single Stage Transistor Amplifiers	1	-	1	-	3	3	2	-	2
7	Multistage Amplifier	1	-	1	2	-	2	-	3	3
8	Power Amplifier	1	-	1	-	-	-	-	4	4
	Total	15	00	15	9	11	20	06	19	25

K = Knowledge

C=Comprehension

A = Application

T=Total

N.B.:-

1. The question pattern will be as per the instruction of SCTE or as per existing rules.
- 2.The objective type questions may be in the form of multiple choice, fill up the blanks, write in one sentence and match the following type.

Suggested Implementation Strategies:- Teacher will use Blackboard, OHP, LCD Projector, Smart board, Video etc for effective teaching learning process .

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7. Course Title: Analog Electronics – I Lab

Course Code	:	ETPC-307
Course Title	:	Analog Electronics – I Lab
Number of Credits	:	1(L: 0,T:0,P:2)
Prerequisites	:	NIL
Course Category	:	ETPC

Learning Objectives:

The main objectives are:

- (i) To provide an experimental foundation for the theoretical concepts introduced in theory classes.
- (ii) Demonstrate the principles taught in the classes.

Course(Practical) Outcomes:

After successful completion of this course students will able to

CO1: Identify and use different Analog Electronics Devices in electronics circuits.

CO2: Apply and examine the theoretical knowledge to perform basic Electronics and Telecommunication experiments.

S.No.	Name of Experiments	Approx. Hrs.	COs
1	To study the VI characteristics of a forward and reverse biased pn junction Diode	02	CO1, CO2
2	To study the VI characteristics of are verse biased Zener diode	02	CO1, CO2
3	Study of diode Clipper and Clamper Circuits	02	CO1, CO2
4	To study the rectifier with and without capacitor filter for: — (a) Half-wave rectifier, (b) Full-wave rectifier, (c) Bridge rectifier	04	CO1, CO2
5	To study the input and output characteristics of BJT for: — (a) C-E configuration, (b) C-C configuration, (c) C-B configuration	04	CO1, CO2
6	To study the FET characteristics	02	CO1
7	To study the MOSFET characteristics	02	CO1, CO2
8	To determine frequency response characteristics of RC coupled amplifier circuit and calculation of band width, mid band gain, input impedance and output impedance for: (a) Single-stage amplifier, (b) Double-stage amplifier	04	CO1, CO2
9	To study the output wave form of push-pull amplifier for Class-A, Class-B& Class-A B operations	04	CO1, CO2

10	To study the V-I characteristics of UJT	02	CO1, CO2
	Total	28	

References:

Suggested Books:

- Principles of Electronics- VK Mehta
- Basic Electronics (Solid state)–B L Theraja
- Electronic Principles- Malvino
- Electronic Devices and Circuits- David A.Bell
- Electronics Devices and circuits-AnilK. Maini
- Electronic Devices and Circuits-S. Salivahanan
- Electronic Devices and Circuits– Milman & Halkias
- Electronic Devices and Circuits–Allen Mottershead
- Integrated Electronics- Millman & Halkias

Suggested software / Learning Websites:

- en.wikipedia.org/wiki/Transformer
- www.electronics-tutorials
- learn.sparkfun.com/tutorials/transistors
- www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf
- www.technologystudent.com/elec1/transis1.htm
- www.learningaboutelectronics.com
- www.electrical4u.com
- Youtube

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3. Course Title: Communication Engineering-I

Course Code	:	ETPC-303
Course Title	:	Communication Engineering-I
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	Fundamentals of Electrical and Electronics Engineering (ES-204)
Course Category	:	ETPC

Aim: One of the major fields of application of Electronics is the Communication Engineering. Communications play a vital role in our lives. Radio Communication, TV, Mobile telephones have become inevitable part of our day to day life. This is the 1st part of the Communication Engineering course by which basic knowledge on communication circuits and systems is aimed to be imparted to the students.

Course Objectives:

- To give students a foundational understanding of the Communication Block Diagram, associated sub-systems and the basic types of signals relevant to a Communication System.
- To provide the students with a clear idea about the concept and need of modulation; its major types ; associated block diagrams and circuits related to generation of respective modulations.
- To develop student's clear basic understanding about electromagnetic spectrum, radiation and propagation concepts alongwith facilitating components i.e. transmission lines, antennas and microwave devices.

COURSE OUTCOME (CO):

On completion of the course, the student will be able to:

CO1- Identify the block diagram of communication systems and distinguish between various types of signals and their frequency spectra.

CO2- Understand the need of modulation in communication engineering and the different types of modulation techniques and their uses.

CO3– Explain wave propagation and the parameters affecting the propagation of waves in various layers of the atmosphere.

CO4- Compare various types of transmission lines and their significance in wave transmission.

CO5- Understand various antennas for wave propagation considering the antenna parameters.

CO6- Analyze different types of microwave devices and their application in Electronic appliances and communication devices.

Course Content:

Chapter No.	Chapter Title	Course Content	Duration Hours
1.	Introduction to Communication Systems	1.1 Introduction to communication systems- Information, Transmitter, Channel-noise and receiver Electromagnetic wave and spectrum, frequency spectra of sinusoidal and non-sinusoidal waves, radio frequency bands. 1.2 Types of signals : continuous and discrete, analog and digital etc, Spectrum of signals, Telecommunication services, Transmission paths.	03
2	Modulation	2.1 Introduction : concept, definition and need of modulation, necessity and definition of modulation, relation between antenna height and wavelength/frequency of waves, Types of modulation : analog modulation (AM, FM and PM) and pulse modulation. High and low level modulation. 2.2 Amplitude Modulation(AM): 2.2.1 Definition and frequency spectrum of the AM wave, representation of AM, power relations in the AM wave 2.2.2 Generation of AM: Basic requirements- Comparison of levels, Grid modulated class C amplifier, Plate modulated class C amplifier, Modulated transistor amplifiers 2.2.3 Double and Single sideband techniques: Need for suppression of carrier, Evolution and description of DSB and SSB, suppression of carrier by the balanced modulator, ring modulator, suppression of the unwanted sideband: The filter system, the phase shift method, the “third” method, Comparison between DSB and SSB 2.2.4 Issues and Challenges in SSB, Vestigial Side Band Modulation. 2.3 Angle Modulation: 2.3.1. Theory of angle modulation, types of angle modulation : frequency	15

		and phase modulation, their definition and description. 2.3.2. Mathematical representation of FM, Frequency spectrum of the FM wave, Phase modulation, comparison of FM and AM. 2.3.3. Generation of frequency modulation : FM methods, direct and indirect methods, stabilized reactance modulator-AFC, indirect method 2.3.4 Generation of Phase modulation with appropriate modulation circuits. 2.3.5 Block diagram generation of FM using PM and PM using FM. 2.3.6 Application of AM and FM circuits.	
3	Radiation and Propagation of Waves	3.1 Electromagnetic radiation- Fundamentals of Electromagnetic waves, effects of the environment, reflection/refraction of radio waves 3.2 Propagation of waves-Ground (surface) waves-Sky wave propagation-The ionosphere–ionospheric layers, stratosphere, atmospheric absorption, tropospheric scattering, space waves, virtual height and skip distance.	08
4	Transmission Lines	4.1 Basic principles-Fundamentals of transmission lines, open wirelines, coaxial cables, Characteristic impedance, losses in transmission lines. 4.2 Standing waves, standing wave ratio, quarter and half wave length lines, impedance matching, reactance properties of transmission lines	06
5	Antennas	5.1 The radiation mechanism, elementary doublet 5.2 Resonant antennas and non-resonant antennas 5.3 Terms and definitions : Antenna gain ,Directive gain, Directivity and Power gain, Antenna resistance, Radiation resistance, Bandwidth, Beam-width and polarization	06

		5.4 Effects of ground on antennas: Ungrounded antennas, grounded antennas, grounding systems, effects of antenna height 5.5 Dipole arrays, Folded dipole antennas and applications 5.6 Types of practical antenna and their application fields	
6	Microwave Devices and Systems	6.1 Introduction to micro wave, fields of application. 6.2 Types of waveguide : rectangular, circular and elliptical etc. Rectangular waveguide theory, calculation of rectangular waveguides, TE modes in rectangular wave guide, TM modes in rectangular wave guide. 6.3 Concept of Tees : H-plane Tee and E-plane Tee, Waveguide Couplers and Directional Couplers.	04
	Class Test		03

Distribution of Marks/ Table of specifications

TABLE OF SPECIFICATIONS FOR THEORY

Sl. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	T
1	Introduction to Communication Systems	03	07	2	-	2
2	Modulation	15	33	5	15	20
3	Radiation and Propagation of Waves	08	18	2	7	09
4	Transmission Lines	06	13	2	6	08
5	Antennas	06	13	5	9	14
6	Microwave Devices and Systems	04	09	3	4	07
7	Class test	03	07	-	-	-
	Total	45	100	19	41	60

K = Knowledge C = Comprehension A = Application
 HA = Higher Than Application (Analysis, Synthesis, Evaluation)

Details Table of Specification for Theory

Sr. No	Topic (a)	Objective Type			Short Answer Type			Long Answer Type		
		K	C	T	K	C	T	K	C	T
1	Introduction to Communication Systems	2	-	2	-	-	-	-	-	-
2	Modulation	5	-	5	-	3	3	-	12	12
3	Radiation and Propagation of Waves	2	-	2	-	2	2	-	5	5
4	Transmission Lines	2	-	2	-	2	2	-	4	4
5	Antennas	3	-	3	2	4	6	-	5	5
6	Microwave Devices and Systems	1	-	1	1	2	3	1	2	3
	Total	15	00	15	03	13	16	01	28	29

K = Knowledge C = Comprehension A =

Application T = Total

N.B.:- 1. The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill up the blanks, write in one sentence and match the following type.

Suggested Implementation Strategies:- Teacher will use Black board, OHP, LCD Projector, Smart board, Video etc for effective teaching learning process

References:

1. Communication Engineering–A. Kumar, Umesh Publications
2. Principles of Communication Engineering- Anokh Singh, S Chand Publishers
3. Electronic Communication- Kennedy, Tata Mcgraw Hill Publishers.
4. Electronic communication- Roddy and Coolen, Pearson Publishers
5. Modern Digital and Analog Communication- B.P. Lathi, Oxford University Press.
6. Communication Systems - Simon Haykin, Wiley India Pvt Ltd

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8.Course Title: Communication Engineering-I Lab

Course Code	:	ETPC-308
Course Title	:	Communication Engineering-I Lab
Number of Credits	:	1 (L: 0, T: 0, P: 2)
Prerequisites	:	Fundamentals of Electrical and Electronics Engineering Lab (ES-209)
Course Category	:	ETPC

Learning Objective:

The main objectives are:

- (i) To provide an experimental foundation for the theoretical concepts introduced in theory classes.
- (ii) Demonstrate the principles taught in the classes with both Experiment Kit boards and simulation softwares such as MATLAB etc.

Course (Practical) Outcomes:

After successful completion of this course students will able to

CO1: Identify and use different Communication Engineering components, circuits and test kit boards.

CO2: Apply and examine the theoretical knowledge to perform basic Communication Engineering experiments on kit boards and/or MATLAB software.

S. No.	Name of Experiments	Approx. Hrs.	Experiment Kit /MATLAB	COs
1	Study of tuned circuits.	02	Experiment Kit	CO1, CO2
2	Study of DSB-SC modulator.	02	Both Experiment Kit and MATLAB	CO1, CO2
3	Study of DSB-TC modulator.	02	Both Experiment Kit and MATLAB	CO1, CO2
4	Study of SSB Modulator	02	Both Experiment Kit and MATLAB	CO1, CO2
5	Study of VSB Modulator	02	Both Experiment Kit and MATLAB	CO1, CO2
6	Study of FM Modulator	02	Both Experiment Kit and MATLAB	CO1, CO2
7	Study of Transmission Lines	02	Experiment Kit	CO1
8	Study of different types of Antennas.	02	Experiment Kit	CO1
9	Study of Microwave Devices	02	Experiment Kit	CO1
Total		18		

References:

1. Communication Engineering–A. Kumar, Umesh Publications
2. Principles of Communication Engineering- Anokh Singh, S Chand Publishers
3. Electronic Communication- Kennedy, Tata Mcgraw Hill Publishers.
4. Electronic communication- Roddy and Coolen, Pearson Publishers
5. Modern Digital and Analog Communication- B.P. Lathi, Oxford University Press.
6. Communication Systems - Simon Haykin, Wiley India Pvt Ltd
7. MATLAB : Demystified Basic Concepts and Applications - K.K. Sarma, Vikas Publishing House.

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Course Code	Course Title	Credit			Assessment Scheme									
		Actual Contact Hrs./Week			Paper Duration (hrs)	Theory			Practical			Credit		
		L	T	P		ESE	SS	Pass Mark	PA	PT	Pass Mark			
ETPC 304	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	3	0	0	3	60	40	40	0	0	0	3		

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Ch. No	Intended Learning Outcomes aligned to CO's.	Chapter title and course content	Duration in Hours
1	ILO1.1 Select instrument on basis of nature of operation. ILO1.2 List static and Dynamic characteristics of the given measuring instrument. ILO 1.3 Identify standard used of given instrument.	Ch-1 Fundamentals of electronic measurements 1.1 Fundamentals of measuring instruments 1.2 Static and dynamic characteristics of instrument 1.3 Calibration and standards of Instrument :International, primary, secondary, working	6
2	ILO2.1 Measure output Voltage at each test point of CRO. ILO2.2 Calculate unknown frequency and phase of given input signal by observing Lissajous pattern. ILO 2.3 Describe the procedure to measure frequency, time-period, voltage using DSO. ILO 2.4 Measure output of Function generator for sine, square, triangular wave-form. ILO2.5 List front panel controls of Spectrum Analyzer. Measure Fundamental and sideband frequency, power of given signal.	Ch.-2 Testing and measuring Instrument 2.1 Cathode Ray Oscilloscope(CRO):Introduction, CRO block diagram, function of each block, uses of CRO: Time and frequency measurement, Voltage measurement, 2.2 Lissagous patterns for phase and unknown frequency measurement 2.3 Digital Storage Oscilloscope(DSO):Introduction, block diagram, operation and uses of digital storage oscilloscope(DSO):Time and frequency measurement, voltage measurement, store and recall mode 2.4 Function generator: Introduction, block diagram, operation and uses of function generator: Sine, square, Triangular waveforms 2.5 Spectrum Analyzer: Introduction, block diagram, operation and uses of spectrum Analyzer: Power Performance of signals	14

3	ILO 3.1 Observe output at each block of Instrumentation system. ILO3.2 Differentiate sensors and transducers. ILO3.3 Suggest transducer for particular application. ILO3.4 Describe working of thermal, optical, magnetic and electric sensors. ILO3.5 Select thermal, optical, magnetic and electric sensors for given application.	Ch.-3 Sensors and Transducers Instrumentation System: Block diagram of Instrumentation system, function of each block Sensors and Transducer: definition, difference between sensors and transducers ,classification of sensors Thermal, optical, magnetic and electric sensors: working principle and applications Transducer: Need for Transducer, selection criteria of transducer, types: primary and secondary, active and passive, analog and digital, resistive, capacitive, inductive (Linear variable differential transformer(LVDT), Rotary variable differential transformer (RVDT), Piezo electric transducer	16
4	ILO 4.1 Identify signal conditioning block in any instrumentation system. ILO4.2Describe the Data Acquisition system.	Ch.-4 Data Acquisition System Signal conditioning: Introduction, types, block diagram and working of AC and DC signal conditioning circuits Data Acquisition Systems(DAS):Introduction, block diagram, working and applications of DAS	6
	Class Test		3

VI. Distribution of Marks/Table of specifications

TABLE OF SPECIFICATIONS FOR THEORY

Sl. No	Topic (a)	Time allotted in hours (b)	Percentage Weight age (c)	K	C	T
1	Fundamentals of Electronic Measurements	06	13	03	02	05
2	Testing and Measuring Instrument	14	31	07	15	22
3	Sensors and Transducers	16	36	07	17	24
4	Data acquisition system	06	13	03	06	09
5	Class test	03	07	-	-	-
	Total	45	100	20	40	60

K = Knowledge C=Comprehension A= Application
 HA=Higher Than Application (Analysis, Synthesis, Evaluation)

VII. Details Table of Specification for Theory

Sr. No	Topic (a)	Objective Type			Short Answer Type			Long Answer Type		
		K	C	T	K	C	T	K	C	T
1	Fundamentals of Electronic Measurements	2	-	2	1	2	3	-	-	-
2	Testing and Measuring Instrument	5	2	5	2	3	5	-	10	12
3	Sensors and Transducers	5	2	5	2	3	5	-	12	14
4	Data acquisition system	3	1	3	-	3	3	-	2	3
	Total	15	05	15	05	11	16	-	24	29

K = Knowledge C=Comprehension A= Application
T=Total

- N.B.:-
- 1.The question pattern will be as per the instruction of SCTE or as per existing rules.
 - 2.The objective type questions may be in the form of multiple choice, fill up the blanks, write in one sentence and match the following type.

Suggested Implementation Strategies:-Teacher will use Blackboard, OHP, LCD Projector, Smart board, Video etc for effective teaching learning process. Visit to nearby Industry to observe working of various instruments and prepare detail report

VIII.SUGGESTED LEARNING MATERIALS / BOOKS

Sl. No.	Author	Title	Publisher with ISBN Number
1	Sawhney,A.K.	Electrical&Electronic Measurements&Instrumentations	Dhanpat Rai & sons,New Delhi,2017orlatest edition 2021.
2	Kalsi,H.S.	Electronic Instrumentation	McGrawHill,NewDelhi,2010ISBN:13-9780070702066 or latest edition
3	David,A.Bell	Electronic Instrumentation and Measurements	OxfordUniversityPress,NewDelhiedition-2013 ISBN : 10:0-19-569614-X or latest edition
4	Helfrick,A.D. Cooper,W.D.	Modern Electronic Instrumentation and measurement Techniques	PearsonEducationIndia,1stEdition,New Delhi,2015,ISBN-13:978orlatestedition
5	Ghosh,A.K	IntroductiontoMeasurement&Instrumentation	PrenticeHallIndiaLearningPrivateLimited2013, 4th or latest Edition, ISBN-13-978-8120346253.
6	Murty,D.V.S.	TransducersandInstrumentaion	PrenticeHallIndiaLearningPrivateLimited,2nd Edition, ISBN-13-978-8120335691
7	Patranabis D.	Sensors and Transducers	PHILearningPrivateLimited,2ndEdition,ISBN- 978-81-203-2198-4

IX. Learning Websites & Portals

Sl. No.	Link/Portal	Description
1	https://en.wikipedia.org/wiki/Electronic_test_equipment	Testing using CRO, multimeter, function generator and spectrum analyser.
2	https://en.wikipedia.org/wiki/List_of_electrical_and_electronic_measuring_equipment	Measuring instruments used in electrical and electronic work.
3	https://en.wikipedia.org/wiki/Instrumentation	Sensors to measure physical and electrical quantities
4	https://en.wikipedia.org/wiki/Flow_measurement	Flow-meters
5	https://en.wikipedia.org/wiki/Data_acquisition	Data acquisition system
Note: Teachers are requested to check the creative common license status/financial implications of ♦ the suggested online educational resources before use by the students		

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5. Course Title: Electronic Workshop

Course code	ETPC-305
Course title	Electronic Workshop
Semester	THIRD SEMESTER
Number of credit	3 (L:T:P = 0:1:4)
Total contact hours	75 Hours
Pre requisite	None

RATIONALE OF THE SUBJECT:

The Electronic Workshop course bridges theoretical knowledge and practical implementation in electronics. It equips students with essential hands-on skills required for designing, assembling, and troubleshooting electronic circuits and systems using various tools, components, and instruments. Through extensive lab practices and project work, the course enhances technical proficiency, critical thinking, and confidence in handling real-life electronic hardware challenges.

PRACTICAL HAND SKILL DEVELOPMENT:

This course emphasizes the development of practical hand skills necessary for working with electronic hardware. Students will gain experience in precision soldering, safe handling of delicate components, efficient use of workshop tools, and systematic testing and fault diagnosis. Regular hands-on practice will ensure that students build confidence, dexterity, and attention to detail in assembling, testing, and troubleshooting real-world electronic systems.

LEARNING OBJECTIVES (LOs):

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

- LO1: Identify various tools, instruments, and electronic components (passive, active, and miscellaneous).
- LO2: Demonstrate safe handling, testing, and measurement techniques using standard lab instruments.
- LO3: Apply soldering and PCB fabrication techniques.
- LO4: Design, simulate, and assemble functional electronic circuits.
- LO5: Troubleshoot faults in circuits using diagnostic tools.
- LO6: Follow safety practices, documentation protocols, and workshop ethics.

COURSE OUTCOMES (COs):

Upon successful completion of the course, students will be able to:

CO1: Demonstrate proficiency in identifying and handling electronic tools, components, and measuring instruments.
 CO2: Assemble and fabricate circuits using breadboards, Vero boards, and PCBs with proper soldering.
 CO3: Simulate, test, and validate circuit designs using software and hardware.
 CO4: Troubleshoot and repair basic electronic systems using test instruments.

GUIDANCE FOR THE INSTRUCTOR:

- To prepare a workshop journal with diagrams, procedures, and layouts, leaving space for student entries.
- To provide standard working procedures and circuit diagrams for all practicals.
- To demonstrate tools, components, testing, and fabrication procedures thoroughly.
- To evaluate students' internal assessment, practical assessment on individual performance and report quality.
- To ensure students strictly follow safety, hygiene, and ethical practices.

ASSESSMENT CRITERIA:

(a) INTERNAL ASSESSMENT/PRACTICAL ASSESSMENT:

Sl No.	Internal Assessment criteria	Marks
1	Identification and demonstration of tools, instruments, components (passive, active, misc.)	24
2	Demonstration of soldering, PCB layout & fabrication, safety practices	36
3	Design, simulation, and construction of circuits on various platforms	36
4	Troubleshooting practice using instruments and documentation of reports	24
Total		120

(b) END SEMESTER EVALUATION/PRACTICAL TEST:

Sl No.	End Semester Evaluation criteria for evaluation of individual performance	Marks
1	Identification and demonstration of electronic workshop tools and components	10

2	Demonstration of PCB fabrication or circuit assembly with safety	20
3	Simulation, testing or fault diagnosis using instruments	20
4	Workshop Viva	30
Total		80

ELECTRONIC WORKSHOP SYLLABUS CONTENT:

Electronic Workshop				
Sl No.	Title	Content	Intended Learning	Duration (in Hours)
1.0	Workshop Tools	Familiarization with different tools like screw drivers, pliers, cutters set.	Identify and classify basic electronic workshop tools such as screwdrivers, pliers, and cutters. Demonstrate proper and safe usage of hand tools in electronic assembly and maintenance tasks.	03
2.0	Laboratory Instruments & Equipment	Familiarization with different Instruments & Equipment like Multimeters, Bench Power Supply, Signal/Function Generators, Oscilloscopes	Operate standard laboratory instruments including multimeters, bench power supplies, signal/function generators, and oscilloscopes. Interpret readings from these instruments for measurement and diagnostic purposes.	08
3.0	Passive & Active components	Familiarization, Handling & Testing of Passive & active components like Resistors, Inductors, Capacitors, Transformers, Diodes, BJTS, FETs, Optoelectronics devices, DIAC etc.	Identify various passive (resistors, capacitors, inductors, transformers) and active (diodes, BJTs, FETs, optoelectronics, DIACs) components. Test and validate the functionality of these components using appropriate tools.	08

4.0	Miscellaneous Components	Familiarization, Handling and Testing of Cells, Batteries, Switches, Relays, Cables & Connectors etc.	Recognize and describe the functions of miscellaneous components like batteries, switches, relays, cables, and connectors. Conduct basic testing procedures to ensure component reliability and suitability.	04
5.0	Soldering/De-soldering Practice	Soldering, spot soldering /De-soldering Practice	Demonstrate proficient soldering and de-soldering techniques on electronic circuits. Maintain safety and precision while using soldering tools.	08
6.0	Printed Circuit Board	Layout-consideration in proper component layout, making component layout from a circuit diagram. PCB fabrication from copper clad	Translate circuit diagrams into practical PCB layouts considering component placement and routing. Fabricate a PCB using copper-clad boards through standard etching and drilling methods.	10
7.0	Special Test Instruments	Familiarization and operation of Logic Probes, Pulsars and IC testers	Operate advanced diagnostic tools like logic probes, pulsars, and IC testers. Interpret results from these instruments to identify faults in digital and analog circuits.	04
8.0	Circuit Design	Design, construction and testing of different electronic circuits on simulation software	Use simulation software to design and test electronic circuits before physical implementation.	14

			Evaluate and modify circuit parameters to ensure optimal performance.	
9.0	Circuit Fabrication	Building and testing of simple circuits on Bread-boards / Vero-boards and on PCBs	Construct and test functional circuits on breadboards, Vero boards, and fabricated PCBs. Validate the performance of assembled circuits through testing and troubleshooting.	16
Total				75

Suggested Learning Resources:

Suggested Books:

- a) Electronic Components & Materials - Madhuri Joshi
- b) An introduction to Electrical Engineering Materials - Indulkar and Thiruvengadam
- c) Electrical Engineering Materials - M. L. Gupta.
- d) Printed Circuit Board Design & Technology-Walter C Bosshart
- e) Practical Electronics for Inventors – Paul Scherz

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11. Course Title: Computer Programming Language



Course Code	:	OE-303
Course Title	:	Computer Programming Language
Number of Credits	:	2 (L: 1, T: 0, P: 0)
Prerequisites	:	Introduction to IT Systems (ES-202)
Course Category	:	OE

Aim: To provide students with a foundational understanding of programming principles and to develop skills in writing, compiling, and debugging C programs for solving basic engineering and technical problems.

Course Objectives:

- To provide students with a foundational understanding of C programming principles.
- To develop skills in writing, compiling, and debugging C programs.
- To apply the fundamental C programming knowledge in solving engineering and technical problems.

COURSE OUTCOME (CO):

On completion of the course, the student will be able to:

CO1- Understand fundamental programming concepts, the structure of a C program, and use basic C language elements.

CO2- Apply control flow statements to alter the sequence of execution and create modular programs using functions.

CO3– implement arrays to store and manipulate collections of similar data, handle character strings and understand the basic concepts of pointers.

CO4- implement and apply user-defined data types (structures and unions) and perform basic file input/output operations.

Course Content:

Chapter No.	Chapter Title	Course Content	Duration Hours
1.	Fundamentals of Programming and Basics of C	1.1 Introduction to Programming: What is programming?, Problem-solving techniques: Algorithms and Flowcharts (simple examples), Translators: Compiler, Interpreter, Assembler. 1.2 Overview of C: History and importance of C, Basic structure of a C program (#include, main(), comments), writing, compiling, and executing a C program	06

		1.3 Constants, Variables, and Data Types: C character set, keywords, and identifiers, Constants (integer, floating-point, character, string), Variables: declaration and initialization, Basic data types: int, float, char, double and void data type. 1.4 Operators and Expressions: Arithmetic operators (+, -, *, /, %), Relational operators (==, !=, >, <, >=, <=), Logical operators (&&, , !), Assignment operators (=, +=, -=, *=, /=, %=), Increment and decrement operators (++, --), Conditional operator (? :), Bitwise operators (brief introduction - conceptual), Operator precedence and associativity, Type casting (implicit and explicit) 1.5 Input and Output Operations: Formatted input: scanf() Formatted output: printf(), Character input/output: getchar(), putchar() [brief introduction]	
2	Control Flow Statements and Functions	2.1 Decision Making Statements : if statement, if-else statement, nested if-else statement, else-if ladder, switch statement, goto statement and its drawbacks. 2.2 Looping Structures: while loop, do-while loop, for loop, Nested loops, break and continue statements 2.3 Introduction to Functions: Need for functions : modularity, reusability, Function definition, declaration (prototype), and call, Function parameters (arguments) and return values, Passing arguments: pass by value, void functions (functions that do not return a value). 2.4 Scope and Lifetime of Variables: Local variables, Global variables, Static variables (brief introduction) 2.5 Recursion: Basic concept of recursion, simple examples : factorial, Fibonacci Series etc.	08
3	Arrays, Strings, and Introduction to Pointers	3.1 Arrays: Introduction to arrays: need and definition, One-dimensional arrays: declaration, initialization, accessing elements, Operations on one-dimensional arrays: traversal, insertion, deletion (conceptual), searching (linear search), sorting (bubble sort - simple implementation), Two-dimensional arrays: declaration, initialization, accessing elements (e.g., matrix representation) 3.2 Strings: Strings as arrays of characters, Declaration and initialization of strings, Reading and writing strings: scanf() with %s, gets() (mentioning its drawbacks), puts(), Standard string library functions (from <string.h>): strlen() - calculating string length, strcpy() - copying a string, strcat() - concatenating	08

		strings, strcmp() - comparing two strings, strstr() - finding a substring (conceptual). 3.3 Introduction to Pointers : Understanding memory addresses, Pointer concepts: definition, declaration and initialization of pointer variables, the address-of (&) operator and indirection (*) operator, accessing variables through pointers, Pointers and arrays (basic relationship, e.g., array name as a pointer), Null pointers.	
4	Structures, Unions, and Basic File Handling	4.1 Structures: Need for structures, Defining a structure, declaring structure variables, Accessing structure members (using the dot . operator), Structure initialization, Arrays of structures, Basic concept of passing structures to functions by value, Pointers to structures, brief introduction to -> operator. 4.2 Unions: Defining a union, declaring union variables, Accessing union members, difference between structures and unions. 4.3 Basic File Handling : Introduction to file I/O, Types of files (text and binary - conceptual), Opening a file: fopen() and different modes (r, w, a, r+, w+, a+), Closing a file: fclose(), Character I/O: fgetc(), fputc(), String I/O: fgets(), fputs(), Formatted I/O: fscanf(), fprintf(), Checking for end-of-file: feof(), Error handling in file operations (basic concept, checking fopen return value)	05
	Class Test		03

Distribution of Marks/ Table of specifications

TABLE OF SPECIFICATIONS FOR THEORY

Sl. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	A	T
1	Fundamentals of Programming and Basics of C	06	20	1	2	2	05
2	Control Flow Statements and Functions	08	27	2	3	4	09
3	Arrays, Strings, and Introduction to Pointers	08	27	2	3	4	09
4	Structures, Unions, and Basic File Handling	05	16	2	2	3	07
5	Class test	03	10	-	-	-	-
	Total	30	100	07	10	13	30

K = Knowledge C = Comprehension A
= Application
HA = Higher Than Application (Analysis, Synthesis, Evaluation)

Detailed Table of specifications for Theory :

Sr. No	Topic (a)	Objective Type				Short Answer Type				Long Answer Type			
		K	C	A	T	K	C	A	T	K	C	A	T
1	Fundamentals of Programming and Basics of C	1	-	-	1	-	2	2	4	-	-	-	-
2	Control Flow Statements and Functions	2	-	-	2	-	2	2	4	-	1	2	3
3	Arrays, Strings, and Introduction to Pointers	2	-	-	2	-	2	2	4	-	1	2	3
4	Structures, Unions and Basic File Handling	2	-	-	2	-	2	-	2	-	-	3	3
	Total	7	-	-	7	-	8	6	14	-	2	7	9

K = Knowledge T = Total

C = Comprehension A =

Application

N.B.:- 1. The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill up the blanks, write in one sentence and match the following type.

Suggested Implementation Strategies:- Teacher will use Black board, OHP, LCD Projector, Smart board, Video etc for effective teaching learning process.

References:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. Yashavant Kanetkar, Let us C, BPB Publication.
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
4. Yashavant Kanetkar, Understanding Pointers in C, BPB Publication.
5. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall.
of India.

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11. Course Title: Computer Programming Language Lab

Course Code	:	OE-303
Course Title	:	Computer Programming Language Lab
Number of Credits	:	2 (L: 0, T: 0, P: 2)
Prerequisites	:	Introduction to IT Systems Lab (ES-208)
Course Category	:	OE

Learning Objective:

The main objectives are:

- (iii) To provide a practical foundation for the programming concepts introduced in theory classes.
- (iv) To develop structured C programs as well as to compile and debug them for solving engineering and technical problems.

Course (Practical) Outcomes:

After successful completion of this course students will be able to

CO1: Implement fundamental C programming constructs including data types, operators, control flow statements, basic input/output operations, and pointer basics.

CO2: Develop structured C programs to solve well-defined problems using functions, arrays, strings, structures, and basic file handling techniques.

S. No.	Name of Experiments	Approx. Hrs.	COs
1	Program for Basic Input/Output and Arithmetic Operations: Write a C program to read two integers from the user, perform arithmetic operations (addition, subtraction, multiplication, division, modulus), and display the results.	02	CO1
2	Program using Decision-Making Statements: Write a C program to find the largest of three numbers using if-else if-else statements OR implement a simple calculator using a switch statement for operations like +, -, *, /.	02	CO1
3	Program using Looping Constructs: Write a C program to calculate the factorial of a given number using a for loop OR print the sum of all even numbers up to N using a while loop.	02	CO1

4	Program to Demonstrate Basic Function Usage: Write a C program that defines a function to calculate the square of a number. The main function should call this function with a user-provided number and print the result.	02	CO1, CO2
5	Program for One-Dimensional Array Operations: Write a C program to read N integer elements into an array, then find the sum and average of these elements. Also, implement a linear search to find a specific element in the array.	02	CO2
6	Program for String Manipulation using Library Functions: Write a C program to demonstrate the use of standard string library functions like strlen(), strcpy(), strcat(), and strcmp() on user-inputted strings.	02	CO2
7	Program to Illustrate Basic Pointer Concepts: Write a C program to declare an integer variable and a pointer to it. Assign the address of the variable to the pointer. Print the value of the variable using both the variable itself and the pointer. Also, demonstrate changing the variable's value through the pointer.	02	CO1
8	Program using Structures to Store and Display Data: Write a C program to define a structure named Book with members like title (string), author (string), and price (float). Read details for 3 books, store them in an array of structures, and then display the information.	02	CO2
9	Program for Two-Dimensional Array (Matrix) Operations: Write a C program to read a 2x2 matrix from the user, and then print the matrix. Optionally, calculate and print the sum of its diagonal elements.	02	CO2

10	Program for Basic File Input/Output Operations: Write a C program to create a text file named "mydata.txt", write a few lines of text (e.g., name and roll number) into it, close the file, then reopen it in read mode and display its contents on the console.	02	CO2
	Total	20	

References:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. Yashavant Kanetkar, Let us C, BPB Publication.
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
4. Yashavant Kanetkar, Understanding Pointers in C, BPB Publication.
5. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall.

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9 . COURSE TITLE::ENGINEERING ECONOMICS AND ACCOUNTANCY

Course Title	:	Engineering Economics and Accountancy
Course Code	:	OE 301
Semester	:	Third
Number of Credits	:	2 (L: 2, T: 0, P: 0)
Prerequisites	:	Nil
Course Category	:	Open Elective

LEARNING OBJECTIVES:

LO1	:	To introduce the students to some important economic and accounting terms.
LO2	:	To acquaint the students with some economic laws and banking organizations etc.
LO3	:	To make the students capable of recording business transaction under double entry system.
LO4	:	To introduce the students about financial statements.

COURSE OUTCOME: After the end of the course, students will be able to:

CO1	:	Define some important economic and accounting terms.
CO2	:	Explain some basic economic laws.
CO3	:	Explain double entry system of book keeping.
CO4	:	Record business transactions under double entry system of book keeping.
CO5	:	Define Financial Statements.

TEACHING SCHEME: (in hours/week)

Theory			Practical (credit)
Lecture	Tutorial	Total credits	
2	0	2	0

TEACHING SCHEME: (in hours)

Theory			Practical
Lecture	Tutorial	Total	Practical
30	0	30	0

EXAMINATION SCHEME:

Theory				Practical				Total Marks
ESE		IA		ESE		IA		100
Full Marks	Pass Marks	Full Marks	Pass Marks	Full Marks	Pass Marks	Full Marks	Pass Marks	
60	24	40	16	0	0	0	0	

DETAILED COURSE CONTENT

Unit	Chapter Title	Contents	Hours
Part A: Engineering Economics			
1	Introduction to Economics	Introduction to Economics : 1.1 Definition of Economics, its utility and definition of engineering economics 1.2 Meaning and concepts of utility, National income, inflation and wants.	2hrs
2	Demand and Supply	2.1 Meaning of demand, The Law of demand and demand schedule 2.2 Meaning of supply and The Law of supply	2hrs
3	Production	3.1 Meaning and factors of production and meaning of production function 3.2 Factors determining efficiency of labour	2hrs
4	Banking Organisations	4.1 Central Bank – its functions 4.2 Commercial banks – its functions	2hrs
5	Pricing	5.1 Objectives of pricing policy 5.2 price determinants 5.3 Price discrimination	2hrs
B. Accountancy			
6	Introduction to Book-Keeping and Accounting	6.1 Definition & objectives of Book- keeping 6.2 Need and advantages of Book- keeping 6.3 Definition of Accounting 6.4 Difference between Book- keeping and Accounting 6.5 Double Entry System – main features 6.6 Advantages and disadvantages of 6.7 Double Entry System 6.8 Concept of Computerized Accounting Software	4hrs

		6.9 Need for Computerized Accounting 6.10 Difference between Manual and Accounting and Computerized Accounting	
7	Transaction	7.1 Definition 7.2 Meaning of Account 7.3 Classification of Accounts: Traditional Approach, Modern Approach 7.4 Meaning of Debit and Credit 7.5 Rules of Debit and Credit	2hrs
8	Journal and Ledger	8.1 Meaning Journal 8.2 Recording of Transactions in Journal 8.3 Meaning of Ledger 8.4 Objectives and utility of Ledger 8.5 Posting and balancing of Ledger 8.6 Distinction between Journal and Ledger 8.7 Names of different Books of Accounts	4hrs
9	Cash Book	9.1 Meaning and importance of Cash Book 9.2 Characteristics and advantages of Cash Book 9.3 Discount – Trade Discount and Cash Discount 9.4 Different types of Cash Book:-Single Column Cash Book, Double Column Cash Book, Triple Column Cash Book 9.5 Bank Reconciliation Statement –Basic idea	4hrs
10	Trial Balance & Errors in Accounting	10.1 Meaning and objects of Trial Balance 10.2 Main features and advantages of Trial Balance 10.3 Preparation of Trial Balance 10.4 Types of errors in accounting.	3hrs
11	Components of Final Accounts:	11.1 Meaning and objectives of trading Account 11.2 Contents of Trading Account 11.3 Meaning and objectives of Profit and Loss Account 11.4 Contents of Profit and Loss Account 11.5 Meaning of depreciation, revenue expenditure and capital expenditure 11.6 Contents of Balance	3hrs
Total Contact Hours			30

Table of Specification															
Units	Allotted Hours	Objective			Short Answer Type				Long Answers Type						Total Marks
		R	U	AP	R	U	AP	AN	R	U	AP	AN	E	C	
1.	2hrs	1			2										3
2.	2hrs		1				2								3

3.	2hrs	2	1											3
4.	2hrs							4						4
5.	2hrs	2	1											3
6.	4hrs	2			2				4					8
7.	2hrs								5					5
8.	4hrs	1			2						6			9
9.	4hrs		1				2				6			9
10.	3hrs	1	1		2		2							6
11.	3hrs	1			2	2		2						7
Total	30 hrs													
Total Marks		15			20			25						60

NB:R: Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

REFERENCE BOOK LIST:

Sl No.	Book Name	Author Name	Publishing House, Volume, ISBN
1	Introductory Micro Economics	Sandeep Garg	DhanpatRai Publication Pvt. Ltd. New Delhi
2	Introductory Macro Economics	Sandeep Garg	DhanpatRai Publication Pvt. Ltd. New Delhi
3	Theory and Practice of Accountancy	B. B. Dam R. A. Sarda R. Barman B. Kalita	Capital Publishing Company, Guwahati – 5
4	Book-Keeping & Accountancy	Juneja, Chawla & Saksena	Kalyani Publisher, New Delhi – 110002
5	Tally. ERP 9 For Beginners	Tally Solutions Pvt. Ltd.	Sahaj Enterprises, Bangalore

10. Course Title: Mathematics – III

1. Course Code : OE-302

2. Semester : Third Semester

3. Number of Credits : 2

4. Aim of the course:

- To learn about derivatives of functions having two or more variables.
- To learn about formation and solution of equations involving differential coefficients.
- To learn how to collect, compile and tabulate similar or different types of large data and to draw valid conclusions from them.
- To learn the use of matrices for solving simultaneous equations.
- To learn method of solving two variables linear programming models by the graphical solution.

5.Course Outcome:

On completion of the course, students will be able to

Co-1 Recognize and differentiate functions having two or more variables.

Co-2 Form and solve first and higher order ordinary differential equations.

Co-3 Study and analyze large data set statistically..

Co-4 Apply Matrix to solve simultaneous linear equations ...

Co-5 Formulate two variables linear programming models by graphical solutions .

6. Teaching scheme(in hours):

Teaching scheme(in hours)		
Lectur es	Tutori al	Total (per week)
2	0	2

7. Examination Scheme:

ESE		Sessional		Total 100 (ESE+Sessional)
Full Marks	Pass Marks	Full Marks	Pass Marks	Pass Mark
60	24	40	16	24+16=40

8.Detailed Course Content:

Chapter No.	Chapter Title	Contents	Intended learning outcomes	hours	Co's
GROUP-A: DIFFERENTIAL CALCULUS					
Hours: 3 Marks: 5					
A1	Partial differentiation	1.1. Function of two or more variables, Definition and meaning of partial derivatives (first order).	1.Understand functions having two or more variables.	3	Co-1
GROUP – B: DIFFERENTIAL EQUATION					
Hours: 15 Marks: 29					
B 1	Differential Equation	1.1.Definition, classification, order and degree of a Differential Equation. 1.2. Formation of Ordinary Differential Equations.	2.Recognize and form differential equations.	3	Co- 2
B 2	Ordinary differential equations of first order and first degree	2.1.Separation of variables. 2.2.Homogeneous equations. 2.3 Equations reducible to homogeneous form. 2.4.Exact equations. 2.5.Linear equations. 2.6.Bernoulli's equations.	3.Can solve differential equation of first order and first degree . 4. Can apply differential equation in solving circuit related problems.	4	Co-2

		2.7.Application of Differential Equations[Laws of voltage ,current related to EC,RC,LRC]			
B 3	Differential Equations of first order and higher degree	3.1. Left hand side resolved into factors, 3.2 3.2. Equations solvable for x, 3.3. Equations solvable for y, 3.4. Clairaut's equations.	5. can solve Solution of different types of first order and higher degree ordinary differential equations.	4	Co- 2
B 4	Differential Equations of second order	4.1.Differential Equations of second order with constant co-efficient and right hand side zero. 4.1.1.Operator D, Auxiliary equation. 4.1.2.Rules for real and equal, real and unequal and complex roots. Complete solution. 4.2. Differential Equations of second order with constant co-efficient and right hand side a simple function of x. [Exponential , Trigonometric and algebraic function].	6. Solve higher order linear Differential Equation . 7. Know about complementary function , particular integral , General solution, particular solution, complete solution of different types of second order differential equations.	4	Co-2

GROUP – C: STATISTICS AND PROBABILITY

Hours: 11 Marks: 15

C 1	Measures of Dispersion	1.1. Range, Quartile Deviation. 1.2. Mean Deviation (from mean, median ,mode) 1.3. Standard Deviation, Variance, Co-efficient of variation.	8. Can find Different types of measures of dispersion	4	Co-3
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C 2	Correlation	2.1.Definition of Bivariate distribution, scatter diagram. 2.2.Determination of Karl-Pearson's co-efficient of Correlation.	9. can find correlation between two variables .	3	Co- 3
C 3	Probability	3.1. Classical definition of probability 3.2.Addition and multiplication laws, related examples (simple cases).	10. Know about definition and uses of probability. 11. Apply Addition and multiplication laws of probability	4	Co- 3

GROUP – D: Matrix, Linear Programming problems.

Hours: 6

Marks: 11

D1	Matrix	1.1.Transpose of a matrix, 1.2.Adjoint of a square matrix 1.3.Inverse of a matrix 1.4.Solution of Simultaneous Linear equations. 1.5.Characteristic Equations.	13. Find inverse of a matrix. 14.Solve simultaneous linear equations using matrix. 15. Find charec roots of matrix.	3	Co- 4
D2	Linear Programming Problems (Basics)	2.1.Introduction of system of Linear equations involving two variables and graphical solution of the system. 2.2Mathematical formulation of LPP (two variables).	16. Solve two variables linear programming models by the graphical solution procedure.	3	Co5

		2.3 Unique optimal feasible solution of LPP with two variables by graphical method. [Infinite no. of solutions, unbounded solutions and no solution cases may be discussed but not for the examination point of view)			
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9. Distribution of Marks:

Chapter No.	Chapter Title	Type of Question			Total Marks
		Objective Type (compulsory)	Short questions	Descriptive questions	
A1	Partial Differentiation		2	3	5
B1	Differential Equation	1+1=2	2		4
B2	Diff. Equation of first ord. first degree	1+1+1+1=4	2	3+3	12
B3	Diff. Equation of first ord. higher degree	1+1=2	2		4
B4	Diff. Equation of	1+1=2	2+2	3	9

	second order				
C1	Measures of Dispersion	1+1=2		3+3	8
C2	Correlation			3	3
C3	Probability	1+1=2	2		4
D1	Matrix	1	2	3	6
D2	LPP		2	3	5
		15	18	27	60

10. Suggested implementation strategies: The syllabus can be completed by taking regular

classes along with tutorial classes. Audio-Visual aids also can be used.

11. Suggested Learning Resources:

- 1. An Introduction to polytechnic mathematics Vol-II by Parbin Ahmed, Ajanta Choudhury, Geetali Das**
- 2. Applied Mathematics (vol. I&II) by R . D. Sharma**
- 3. Engineering Mathematics by H .K. Das**
- 4. Mathematics for Polytechnics by S.P. Deshpande.**

Annexure-I

TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	A	HA
1	DIFFERENTIAL CALCULUS	3	6.7	2	0	3	
2	DIFFERENTIAL EQUATION	15	48.9	8	16	5	
3	STATISTICS AND PROBABILITY	11	26.7	4	5	8	
4	MATRIX, LPP	6	17.8	0	4	5	
Total		Σ b=35	100				

K = Knowledge

C = Comprehension

A = Application

HA = Higher Than Application (Analysis, Synthesis, Evaluation)

$$c = \frac{b}{\Sigma b} \times 100$$

DETAILED TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	Topic	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE				
		K	C	A	T	K	C	A	HA	T	K	C	A	HA	T
1	DIFFERENTIAL CALCULUS					2				2			3		3
2	DIFFERENTIAL EQUATION	4	6		10	2+2	4	2		10		6	3		9

3	STATISTICS AND PROBABILI TY	2	2		4		2			2		3	6		9
4	MATRIX,LPP		1		1			2	2	4		3	3		6

K = Knowledge, C= Comprehension, A = Application, HA = Higher Than Application, T=Total

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13. COURSE TITLE: ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

Course Code:	Subject Title	Semester	Hours Per Week			Credit
AU-301	Essence of Indian Knowledge and Tradition	III	L	T	P	0
			2	0	0	

Pre-requisites: Nil

Learning Objectives:

1. To introduce the foundational elements of Indian Knowledge Systems (IKS).
2. To explore the scientific and technological heritage of India in ancient times.
3. To build awareness of traditional Indian philosophy, ethics, and medicine.
4. To encourage appreciation for the relevance of IKS in modern contexts.
5. To develop basic research interest in India's indigenous knowledge base and innovations.

Course Outcome (CO): After completion of this course, the students will be able to:

CO	Statement of Course Outcomes
CO1	Explain the concept, scope, and sources of Indian Knowledge Systems.
CO2	Identify significant contributions of ancient India to science, technology, and mathematics.
CO3	Understand traditional Indian governance, education, and core societal values.
CO4	Understand traditional wellness systems and sustainable living practices rooted in Indian Knowledge Systems.
CO5	Appreciate Traditional Indian Knowledge and its relevance in modern contexts.

Syllabus:

Unit No.	Description	Contact Hours
I	Fundamentals of Indian Knowledge System(IKS): • Definition, Importance, and Scope of IKS • Overview of major IKS Texts: Vedas, Upanishads, Puranas etc. • Classification of knowledge in Indian traditions: Vidyas (Science) and Kalas (Arts)	4

II	Science and Technological Heritage: - Mathematics: Sulbasutras, Contributions of Aryabhatta, Bhaskaracharya - Astronomy and Cosmology: SuryaSiddhanta, Planetary motion, Concept of Time - Metallurgy and Material Sciences: Iron Pillar, Woltz Steel, Ayurvedic alloys - Chemistry of Dyes, Pigments and Chemicals - Civil Engineering and Architecture: Temple architecture, Town planning and water management	12
III	Governance, Society and Education Systems: - Ancient Indian Polity and Administration - Education systems: Gurukula, Nalanda, Takshashila - Value based education: Satya, Ahimsa, Seva - Role of Teacher and Student in Society	6
IV	IKS in Holistic Wellness and Sustainable Living: - Foundations of Ayurveda, Yoga and Siddha - Holistic health and wellness practices - Agriculture, Animal husbandry, Sacred groves, Sacred water bodies; Land, Water and Soil Conservation and Management practices.	4
V	The Modern Relevance of Indian Knowledge Systems: - Practices of Traditional Indian Knowledge in Modern Science and Engineering - IKS and Entrepreneurships: Organic Farming ,Ayurveda based Start-ups - Government initiatives: National Education Policy 2020, IKS Division under AICTE	4
	Total Contact Hours	30

Suggested Books and Other Study Materials:

1. “Indian Knowledge Systems”-Kapil Kapoor and Avadhesh Kumar Singh.
 2. “Ancient Indian Leaps into Mathematics”- B.S.Yadav.
 3. “Science and Technology in Ancient India”- O.P.Jaggi.
 4. “The Positive Sciences of the Ancient Hindus”- Brajendranath Seal.
 5. AICTE Model Curriculum for IKS(Available online)
- NPTEL/SWAYAM courses on IKS
 - AICTE-IKS Portal(<https://iksindia.org/>)
 - Digital Library of India (<https://dli.gov.in>)

Table of Specification for Essence of Indian Knowledge and Tradition (Theory)

SI No	Contact Hours	Units	Objective			Short answer type				Long answer type						Total Marks
			R	U	A P	R	U	A P	A N	R	U	A P	A N	E	C	
1	4	Unit I	1	1	1	1	2	0	0	0	0	2	0	0	0	8
2	12	Unit II	3	1	1	2	2	0	0	1	2	3	9	0	0	24
3	6	Unit III	1	1	0	2	1	0	0	2	1	1	3	0	0	12
4	4	Unit IV	1	1	0	1	1	0	0	2	1	1	0	0	0	8
5	4	Unit V	1	1	1	2	0	0	0	0	1	2	0	0	0	8
	30	Total Marks	7	5	3	8	6	0	0	5	5	9	12	0	0	60

NB: R: Remember, U: Understand, AP: Apply, AN: Analyze, E: Evaluate, C: Create

Annexure-1: Essence of Indian Knowledge and Tradition (Theory)

SI No	Units	Time Allotted (Hrs)	Percentage Weightage	R	U	AP	AN	E	C	Total Marks
1	I	4	13.33%	2	3	3	0	0	0	8
2	II	12	40.00%	6	5	4	9	0	0	24
3	III	6	20.00%	5	3	1	3	0	0	12
4	IV	4	13.33%	4	3	1	0	0	0	8
5	V	4	13.33%	3	2	3	0	0	0	8
	Total	30	100%	20	16	12	12	0	0	60

Curriculum Development cell, State Council for Technical Education, Directorate of Technical Education, Assam

Sl. No.	Name	Designation
1	Shri Dhrubajyoti Borah, ACS	Director of Technical Education, Assam
2	Dr. Indrani Gogoi	Joint Director of Technical Education, Assam
3	Dr. Mrinalini Das	Controller of Examination, State Council for Technical Education, DTE, Assam
4	Mr. Ankush Borgohain	Training cum Placement Officer, DTE, Assam
5	Shri Ashok Das	Principal, Assam Textile Institute
6	Dr. Utpal Baruah	Principal, Kamrup Polytechnic
7	Shri Boobool Sarma	Assistant Controller of Examination, SCTE, DTE, Assam

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