

# **USHARAMA**

**COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**(AUTONOMOUS)**

(Approved by A.I.C.T.E & Permanently Affiliated to JNTU, Kakinada)

Accredited by NAAC with "A" Grade  
on NH 16, Telaprolu, Krishna Dist – 521109

## **B.TECH**

### **ELECTRICAL & ELECTRONICS**

### **ENGINEERING**

### **FRESHERS HAND BOOK**

(Applicable for the batches admitted from the Academic Year 2019-20)

**DEPARTMENT OF ELECTRICAL & ELECTRONICS**  
**ENGINEERING**

**Course Structure**  
**Electrical and Electronics Engineering**  
**(Applicable for batches admitted from 2019-2020)**

<b>I SEMESTER</b>								
<b>S. No</b>	<b>Course Category</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Contact Hrs./wk</b>	<b>C</b>
1	HMC	UR19HM101	Communicative English	2	0	0	2	2
2	BSC	UR19BSC101	Linear Algebra & Calculus	3	1	0	4	4
3	BSC	UR19BSC108	Applied Physics	3	0	0	3	3
4	ESC	UR19ESC108	Engineering Graphics & Drafting	1	0	3	4	2.5
5	ESC	UR19ESC109	Fundamental of Computer Science	3	0	0	3	3
6	HMC	UR19HML101	Communicative English Lab	0	0	2	2	1
7	BSC	UR19BSCL102	Applied Physics Lab	0	0	3	3	1.5
8	ESC	UR19ESCL101	Engineering Workshop and IT Workshop	0	0	3	3	1.5
<b>MANDATORY COURSE</b>								
9	MC	UR19MC102	Applied Physics-Virtual Lab*	0	0	0	2	0
<b>Total</b>				<b>12</b>	<b>1</b>	<b>11</b>	<b>26</b>	<b>18.5</b>
<b>*Internal evaluation</b>								

<b>II SEMESTER</b>								
<b>S. No</b>	<b>Course Category</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Contact Hrs./wk</b>	<b>C</b>
1	HMC	UR19HM202	Professional English	2	0	0	2	2
2	BSC	UR19BSC205	Differential Equations & Vector Calculus	3	0	0	3	3
3	BSC	UR19BSC203	Numerical Methods and Transforms	3	0	0	3	3
4	BSC	UR19BSC210	Applied Chemistry	3	0	0	3	3
5	ESC	UR19ESC202	Electrical Circuit Analysis-I	3	0	0	3	3
6	ESC	UR19ESC210	Problem Solving & Programming Using C	3	0	0	3	3
7	HMC	UR19HML202	Professional English Lab	0	0	3	3	1.5
8	BSC	UR19BSCL203	Engineering and Applied Chemistry Lab	0	0	3	3	1.5
9	ESC	UR19ESCL202	Problem Solving & Programming Using C Lab	0	0	3	3	1.5
<b>MANDATORY COURSES</b>								
10	MC	UR19MC200	Engineering Exploration Project*	0	0	0	1	0
11	MC	UR19MC203	Constitution of India	0	0	0	2	0
<b>Total</b>				<b>17</b>	<b>0</b>	<b>9</b>	<b>29</b>	<b>21.5</b>
<b>*Internal evaluation</b>								

III SEMESTER								
S. No	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./wk	C
1	PCC	UR19PCEE301	Electrical Machines-I	3	1	0	4	4
2	PCC	UR19PCEE302	Electrical Circuit Analysis-II	3	0	0	3	3
3	PCC	UR19PCEE303	Electromagnetic Field	2	1	0	3	3
4	PCC	UR19PCEE304	Electronic Devices and Circuits	3	0	0	3	3
5	PCC	UR19PCEE305	Thermal and Hydro Prime Movers	2	0	0	2	2
6	HMC	UR19HM301	Managerial Economics and Financial Analysis	3	0	0	3	3
7	PCC	UR19PCEEL301	Electrical Circuit and Pspice Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL302	Thermal and Hydro Lab	0	0	3	3	1.5
MANDATORY COURSE								
9	MC	UR19MC301	Environmental Studies	0	0	0	2	0
<b>Total</b>				<b>16</b>	<b>2</b>	<b>6</b>	<b>26</b>	<b>21</b>
Employability Skills- I*							2	0
<b>*Internal evaluation</b>								

IV SEMESTER								
S. No	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./wk	C
1	PCC	UR19PCEE401	Electrical Machines-II	3	1	0	4	4
2	PCC	UR19PCEE402	Power Systems-I	3	0	0	3	3
3	PCC	UR19PCEE403	Control Systems	2	1	0	3	3
4	PCC	UR19PCEE404	Switching Theory and Logic Design	3	0	0	3	3
5	PCC	UR19PCEE405	Electrical Measurements	3	0	0	3	3
6	PCC	UR19PCEEL401	Electrical Machines-I Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL402	Electronic Devices and Circuits Lab	0	0	3	3	1.5
MANDATORY COURSE								
1	PROJ	UR19MPROJ401	Mini Project	0	0	0	2	0
<b>Total</b>				<b>14</b>	<b>2</b>	<b>6</b>	<b>26</b>	<b>19</b>
Self Learning *(Technical Certificate)							1	0
<b>*Internal evaluation</b>								

V SEMESTER								
S. No	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./wk	C
1	PCC	UR19PCEE501	Linear and Digital IC Applications	3	0	0	3	3
2	PCC	UR19PCEE502	Power Systems-II	3	0	0	3	3
3	PCC	UR19PCEE503	Power Electronics	3	0	0	3	3
4	PCC	UR19PCEE505	Signals and Systems	3	0	0	3	3
Professional Elective – I								
5	PEC	UR19PEEE501	Industrial Drives and Application	3	0	0	3	3
		UR19PEEE502	Smart Grid					
		UR19PEEE503	Renewable Energy sources					
6	PCC	UR19PCEEL501	Electrical Machines-II Lab	0	0	3	3	1.5
7	PCC	UR19PCEEL502	Electrical Measurements Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL503	Control Systems Lab	0	0	3	3	1.5
MANDATORY COURSE								
9	MC	UR19MCL501	Virtual Electrical Machines Lab*	0	0	0	2	0
<b>Total</b>				<b>15</b>	<b>0</b>	<b>9</b>	<b>26</b>	<b>19.5</b>
Employability Skills- II*							2	0
Self Learning *(Technical Certificate)							2	0
<b>*Internal evaluation</b>								

VI SEMESTER								
S. No	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./wk	C
1	PCC	UR19PCEE601	Power Systems Analysis	3	0	0	3	3
2	HMC	UR19HM 601	Management Science	3	0	0	3	3
3	PCC	UR19PCEE603	Electrical Drives	3	0	0	3	3
4	PCC	UR19PCEE504	Microprocessors and Microcontrollers	3	0	0	3	3
Professional Elective – II								
5	PEC	UR19PEEE601	Design of Electrical Apparatus	3	0	0	3	3
		UR19PEEE602	Electric Machine design					
		UR19PEEE603	Electrical Materials					
6	OEC	---	<b>Open Elective-I</b>	3	0	0	3	3
7	PCC	UR19PCEEL601	Power Electronics Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL602	Microprocessors and Microcontrollers Lab	0	0	3	3	1.5
MANDATORY COURSES								
9	MC	UR19MC601	Essence of Indian Traditional Knowledge	0	0	0	2	0
10	MC	UR19MCL602	Virtual Power Lab*	0	0	0	2	0
12	PROJ	UR19MPROJ603	Mini Project	0	0	0	2	0
<b>Total</b>				<b>18</b>	<b>0</b>	<b>6</b>	<b>30</b>	<b>21</b>
<b>*Internal evaluation</b>								

VII SEMESTER								
S. No	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./wk	C
1	PCC	UR19PCEE701	Switch Gear and Protection	3	0	0	3	3
2	PCC	UR19PCEE702	Utilization of Electrical Energy	3	0	0	3	3
Professional Elective – III								
3	PEC	UR19PEEE701	Digital Control Systems	3	0	0	3	3
		UR19PEEE702	Electrical and Electronics Instrumentation					
		UR19PEEE703	Electrical Distribution System					
Professional Elective – IV								
4	PEC	UR19PEEE704	Advanced Control Systems	3	0	0	3	3
		UR19PEEE705	Special Electrical Machines					
		UR19PEEE706	HVDC & EHV AC Transmission System					
5	OEC	---	Open Elective – II	3	0	0	3	3
7	PCC	UR19PCEEL701	Power Systems Lab	0	0	3	3	1.5
8	PCC	UR19PCEEL702	Electrical Simulation Lab	0	0	3	3	1.5
10	PROJ	UR19PROJEE711	Internship	0	0	0	0	2
11	PROJ	UR19PROJEE701	Project Stage-I	0	0	3	0	1.5
Total				15	0	9	21	21.5

VIII SEMESTER								
S. No	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./wk	C
1	PCC	UR19PCEE801	Power System Operation and Control	3	0	0	3	3
Professional Elective – V								
2	PEC	UR19PEEE801	FACTS	3	0	0	3	3
		UR19PEEE802	Power System Deregulation					
		UR19PEEE803	High Voltage Engineering					
3	OEC	---	<b>Open Elective – III</b>	3	0	0	3	3
4	PROJ	UR19PROJEE801	Project Stage-II	0	0	18	18	9
<b>Total</b>				<b>9</b>	<b>0</b>	<b>18</b>	<b>27</b>	<b>18</b>

**Total Credits = 18.5+21.5+21+19+19.5+21+21.5+18=160**

## List of Open Electives

### Open Electives offered by the Dept. of CE

S.No.	Course Code	Open Elective-I
1.	UR19OECE 601	Introduction To GIS
2.	UR19OECE 602	Environmental Pollution Control
	<b>Course Code</b>	<b>Open Elective-II</b>
3.	UR19OECE701	Metro Systems and Engineering
4.	UR19OECE702	Natural Disaster Mitigation and Management
	<b>Course Code</b>	<b>Open Elective-III</b>
5.	UR19OECE801	Sanitary and Public Health Engineering
6.	UR19OECE802	Environmental and Industrial Hygiene

### Open Electives offered by the Dept. of EEE

S.No.	Course Code	Open Elective-I
1.	UR19OEEE601	Neural Networks and Fuzzy Logic
2.	UR19OEEE602	Linear Control Systems
3.	UR19OEEE603	Electrical Safety Management
	<b>Course Code</b>	<b>Open Elective – II</b>
4.	UR19OEEE701	Programmable Logic Controllers
5.	UR19OEEE702	Energy Audit and Conservation Management
6.	UR19OEEE703	Electrical Technology
	<b>Course Code</b>	<b>Open Elective – III</b>
7.	UR19OEEE801	Non Conventional Energy Sources
8.	UR19OEEE802	Industrial Electrical Operation
9.	UR19OEEE803	Hybrid Electric Vehicles

**Open Electives offered by the Dept. of ME**

<b>S.No.</b>	<b>Course Code</b>	<b>Open Elective-I</b>
1.	UR19OEME601	Nano Technology
2.	UR19OEME602	Robotics
3.	UR19OEME603	Power Plant Engineering
	<b>Course Code</b>	<b>Open Elective-II</b>
4.	UR19OEME701	Operations Research
5.	UR19OEME702	Industrial Engineering & Quality control
6.	UR19OEME703	Advanced materials
	<b>Course Code</b>	<b>Open Elective-III</b>
7.	UR19OEME801	Optimization Techniques
8.	UR19OEME802	Green Engineering systems
9.	UR19OEME803	Mechatronics

**Open Electives offered by the Dept. of ECE**

<b>S.No.</b>	<b>Course Code</b>	<b>Open Elective-I</b>
1	UR19OEEC601	Consumer Electronics
2	UR19OEEC602	Digital Electronics
	<b>Course Code</b>	<b>Open Elective-II</b>
3	UR19OEEC701	Embedded Systems
4	UR19OEEC702	Internet of Things (IoT)
	<b>Course Code</b>	<b>Open Elective-III</b>
5	UR19OEEC801	Microcontrollers
6	UR19OEEC802	Principles of Electronic Communications

**Open Electives offered by the Dept. of CSE**

<b>S.No.</b>	<b>Course Code</b>	<b>Open Elective-I</b>
1.	UR19OECS601	Java Programming
2.	UR19OECS602	Data Base Management Systems
3.	UR19OECS603	C++ Programming
	<b>Course Code</b>	<b>Open Elective-II</b>
4.	UR19OECS701	Distributed Computing
5.	UR19OECS702	Deep Learning
6.	UR19OECS703	AI and ML for Robotics
	<b>Course Code</b>	<b>Open Elective-III</b>
7.	UR19OECS801	AI Tools & Techniques
8.	UR19OECS802	Information Security
9.	UR19OECS803	Big Data

**Open Electives offered by the Dept. of IT**

<b>S.No.</b>	<b>Course Code</b>	<b>Open Elective-I</b>
1.	UR19OEIT101	Data Structures
2.	UR19OEIT102	Computer Graphics
3.	UR19OEIT103	Data Science
	<b>Course Code</b>	<b>Open Elective – II</b>
4.	UR19OEIT201	Operating Systems
5.	UR19OEIT202	Python Programming
6.	UR19OEIT203	Web Technologies
	<b>Course Code</b>	<b>Open Elective – III</b>
7.	UR19OEIT301	Information Security
8.	UR19OEIT302	Mobile Application Development
9.	UR19OEIT303	Block Chain Technologies



**COMMUNICATIVE ENGLISH**

(Common to all branches)

**Course Objectives:**

- Recall and improve the language proficiency of the students in English
- Paraphrase and interpret the ideas and thoughts in a dynamic way
- Prioritize the importance of practical learning of English
- Distinguish the various levels of Listening, Speaking, Reading and writingskills
- Construct statements in writing and speaking in professional manner

**UNIT – I****Poem:** “Life” by Sarojini Naidu**Grammar:** Articles**Vocabulary:** Prefixes and Suffixes**Writing:** Paragraph Writing**Life-Skills:** Attitude**UNIT – II****Essay:** A Drawer full of Happiness**Grammar:** Prepositions**Vocabulary:** Homonyms, Homophones, Homographs**Writing:** Letter of Request and Apology**Life-Skills:** Self- Management**UNIT – III****Short Story:** “Half a Rupee Worth” by R.K. Narayan**Grammar:** Tenses**Vocabulary:** Idiomatic Expressions; Phrasal Verbs**Writing:** Letter of Complaint and Appreciation**Life-Skills:** Body Language**UNIT – IV****Text:** Stephen Hawking – Positivity ‘Benchmark’**Grammar:** Question Tags, Conjunctions**Vocabulary:** One - Word Substitutes, Collocations**Writing:** Dialogue and Speech Writing**Life-Skills:** Being Assertive**UNIT – V****Poem:** Once Upon a Time by Gabriel Okara**Grammar:** Degrees of Comparison**Vocabulary:** Technical Abbreviations**Writing:** E-mail Writing, Preparation of Resume and Letter of application**Life-Skills:** Goal Setting, Working in a Team**TEXT BOOK:**

‘InfoTech English’ – Maruti Publications

**REFERENCE BOOKS:**

Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge University Press  
Practical English Usage, Michael Swan, OUP, 1995

**NPTEL ONLINE COURSE:**

'Enhancing Soft skills & Personality Development

**Course Outcomes:**

- CO1:** Apply critical-thinking to develop writing skills
- CO2:** Understand and evaluate different kinds of prose texts.
- CO3:** Describe distinct literary characteristics of poems.
- CO4:** Analyze the major and minor details of a biography.
- CO5:** Develop grammar and vocabulary skills
- CO6:** Evaluate the effectiveness in improving life-skills.

\*\*\*\*\*

**LINEAR ALGEBRA & CALCULUS**

(Common to all branches)

**Course Objectives:**

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

**UNIT – I**

**Matrices:** Solving system of homogeneous and non-homogeneous linear equations by Gauss elimination method. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

**UNIT – II**

**Sequences and Series:** Convergence and divergence, Ratio test - Comparison test -Cauchy's root test-. Fourier series, Euler's formulae, conditions for Fourier expansion, Even and Odd functions.

**UNIT – III**

**Mean Value Theorems:** Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (single variable & without proofs).

**UNIT – IV**

**Multivariable calculus:** Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

**UNIT – V**

**Multiple Integrals:** Double integrals, change of order of integration, double integration in polar coordinates. Evaluation of triple integrals, change of variables.

**TEXT BOOK:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers

**Course Outcomes:**

- CO1:** Develop the use of matrix algebra techniques that is needed by engineers for practical Applications
- CO2:** Find or compute the Fourier series of Fourier series periodic signals.
- CO3:** Utilize mean value theorems to real life problems.
- CO4:** Translate the given function as series of Taylor's and Maclaurin's with remainders.
- CO5:** Familiarize with functions of several variables which are useful in optimization.
- CO6:** Apply Double integration in evaluating areas bounded by regions.

\*\*\*\*\*

**APPLIED PHYSICS**

(EEE &amp; ECE)

**Course Objectives:**

- Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.
- Impart the knowledge of materials with characteristic utility in appliances.

**UNIT – I**

**INTERFERENCE:** Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings.

**DIFFRACTION:** Diffraction - Fraunhofer Diffraction - Diffraction due to Single slit (quantitative), Double slit, N -slits and circular aperture (qualitative) – Intensity distribution curves - Diffraction Grating – Grating spectrum – missing order – resolving power – Rayleigh's criterion – Resolving powers of Microscope, Telescope and grating (qualitative).

**UNIT – II**

**QUANTUM MECHANICS:** Introduction – Matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G.P.Thomson experiment – Heisenberg's Uncertainty Principle –interpretation of wave function – Schrödinger Time Independent and Time Dependent wave equations – Particle in a potential box.

**UNIT – III**

**FREE ELECTRON THEORY & BAND THEORY OF SOLIDS :** Introduction – Classical free electron theory (merits and demerits only) - Quantum Free electron theory – electrical conductivity based on quantum free electron theory – Fermi Dirac distribution function – Temperature dependence of Fermi-Dirac distribution function - expression for Fermi energy -Density of states.

Bloch's theorem (qualitative) – Kronig-Penney model(qualitative) – energy bands in crystalline solids – E Vs K diagram – classification of crystalline solids – effective mass of electron –  $m^*$  Vs K diagram - concept of hole.

**UNIT – IV**

**SEMICONDUCTOR PHYSICS:** Introduction – Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents – Einstein's equation.

**UNIT – V**

**MAGNETISM & DIELECTRICS:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism - Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material.

Introduction - Dielectric polarization – Dielectric Polarizability, Susceptibility and Dielectric constant- types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossotti equation - Frequency dependence of polarization – Applications of dielectrics.

**TEXT BOOKS:**

1. "A Text book of Engineering Physics" by M.N. Avadhanulu, P.G. Kshirsagar - S. Chand Publications, 2017.
2. "Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2015).
3. "Engineering Physics" by R.K. Gaur. and S.L. Gupta., - Dhanpat Rai publishers, 2012.

**REFERENCE BOOKS:**

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).
2. Lasers and Non-Linear optics by B.B. Laud, New Age International Publishers (2008).
3. Engineering Physics by M. Arumugam, Anuradha Publication (2014).
4. Physics for Engineers by M.R. Srinasan, New Age international publishers (2009).

**Course Outcomes:**

- CO1:** Explain the need of coherent sources and the conditions for sustained interference and illustrate the resolving power of various optical instruments.
- CO2:** Explain the fundamental concepts of quantum mechanics and analyze the physical significance of wave function.
- CO3:** Explain the various electron theories and interpret the effects of temperature on Fermi Dirac distribution function
- CO4:** Explain the various energy bands
- CO5:** Classify the energy bands of semiconductors and outline the properties of n-type and p-type Semiconductors.
- CO6:** Explain the applications of dielectric and magnetic materials.

\*\*\*\*\*

Internal: 30 Marks

External: 70 Marks

**ENGINEERING GRAPHICS & DRAFTING  
(CIVIL/EEE/ECE)****PRE-REQUISITES:** Mathematics, Physics**COURSE EDUCATIONAL OBJECTIVE**

- Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

**UNIT – I INTRODUCTION TO ENGINEERING DRAWING:**

Introduction: Principles of Engineering Graphics and their significance - Drawing Instruments - Geometrical Constructions.

**Polygons:** Constructing regular polygons by general methods, inscribing and describing polygons on circles.

**Curves:** Ellipse, Parabola and Hyperbola by general methods,

**Scales:** Diagonal scales and Vernier scales

**UNIT – II**

**ORTHOGRAPHIC PROJECTIONS:** Principle of orthographic projection-Method of Projections – First and third angle projection methods Projections of Points – Projections of straight lines of different orientations - True lengths and traces.

**UNIT – III**

**PROJECTIONS OF PLANES & SOLIDS:** Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes. Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**UNIT – IV**

**ISOMETRIC VIEWS:** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

**UNIT – V**

**COMPUTER AIDED DRAFTING:** Introduction – Computer Aided drafting system – Advantages, Applications of AUTOCAD, Drafting software-AUTOCAD-Advantages, Initial setup commands, utility commands, Drawing Aids, Entity Draw commands, Display commands, Edit commands, Lettering & Dimensioning

**TEXT BOOKS:**

- 1.N. D. Bhatt, Engineering Drawing, Revised and Enlarged Edition, Charotar publishers,
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

**REFERENCE BOOKS:**

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by P.I Varghese, McGrawHill Publishers

**Course Outcomes:**

- CO1:** Represent the geometrical objects considering BIS standards.
- CO2:** Comprehend the basics of orthographic projections and deduce orthographic projections of a point and a line at different orientations.
- CO3:** Visualize geometrical planes of different positions in real life environment
- CO4:** Draw the projection of various types of solids.
- CO5:** Imagine orthographic views of various solid objects at different orientations
- CO6:** Recognize the significance of isometric drawing to relate 2D environment with 3D environment. Learn basics of CAD.

\*\*\*\*\*

**FUNDAMENTALS OF COMPUTER SCIENCE**  
**(EEE/CSE/IT)**

**Course Objectives:**

To study different types and working of a digital computer.

- To learn different number systems and representation of floating point numbers.
- To understand the need and working of memory and other peripheral devices.
- To be familiar with the internal organization of a computer.
- To study the interconnection of computers and applications of computer.

**UNIT – I INTRODUCTION**

History of Digital computers, types of computers, block diagram of a digital computers, various parts of a digital computer. Computer programming — Machine language, assembly language and high-level language programming.

**UNIT – II****NUMBER SYSTEMS**

Binary, Octal, Decimal and Hexadecimal number systems, conversion of numbers from one system to other system, Fixed point and floating-point representation of numbers, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic Operations

**UNIT – III****MEMORY AND PERIPHERALS**

Memories: Need for memory, Types of computer memories — magnetic, Dynamic and static memories, RAM, ROM, EPROM and EEPROM memories, Cache memory, Concept of Virtual memory. Peripheral Devices: Working of Keyboard and Mouse. Types of Printers and it's working. I/O Ports, Addressing I/o devices — programmed I/O, interrupt I/O, DMA.

**UNIT – IV****COMPUTER ORGANISATION**

Organization of a processor - Registers, ALU and Control unit, Register transfer language, micro operations, Instruction codes, Computer instructions, Instruction formats, Instruction cycle, Memory Reference Instructions, Input — Output instructions, Control memory, Address sequencing, Design of control unit-micro programmed control, hard wired control.

**UNIT – V****APPLICATIONS**

Various applications of Computers, Networking of Computers, LAN, WAN, MAN, Internet. Internet of Things (IoT) applications to electrical engineering.

**TEXT BOOKS:**

1. Computer Fundamentals By PK Sinha, 6th Edition, BPB publications.
2. Fundamentals of Computers by E. Balagurusamy, McGrawHill edition.
3. Computer Fundamentals by Anitha Goel, Pearson education



**Course Outcomes:**

- CO1: Understand the functioning and programming of computers.
- CO2: Convert numbers from one type of system to other type of system.
- CO3: Distinguish between different types of memories and learn the mapping of I/O devices.
- CO4: Understand the functioning of peripheral devices and addressing I/o devices.
- CO5: Demonstrate the internal organization of digital computer.
- CO6: Apply digital computers for storing electrical engineering problems.

\*\*\*\*\*

**COMMUNICATIVE ENGLISH LAB**

(Common to all branches)

**Course Objectives:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

**List of Activities**

- 1) Introducing yourself
- 2) Greeting
- 3) Thanking and Responding to thanks
- 4) Requesting and Responding to requests
- 5) Making and Responding to complaints
- 6) Apologising and accepting apologies
- 7) Consonants : Plosives, Affricates and Nasals
- 8) Consonants: Fricatives, Liquids and Glides
- 9) Vowels: Pure vowels
- 10) Vowels: Diphthongs
- 11) Consonant clusters
- 12) Word Accent
- 13) Word Stress
- 14) Intonation

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Reference Manuals:**

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd 'Strengthen Your Communication Skills' published by Maruthi Publications

**Course Outcomes:**

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

- CO1 Apply expressions in day to day life
- CO2 Build language proficiency by using patterns
- CO3 Develop communication skills through various language activities
- CO4 Outline of Letters and Sounds
- CO5 Identify consonants and vowel sounds in phonetic script
- CO6 Understand pronunciation, stress and intonation

\*\*\*\*\*

**APPLIED PHYSICS LAB****Course objectives:**

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

**List of Experiments**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Energy Band gap of a Semiconductor p - n junction.
6. Characteristics of Thermistor – Temperature Coefficients
7. Determination of dielectric constant by charging and discharging method
8. Determination of resistivity of semiconductor by Four probe method.
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10. Measurement of magnetic susceptibility by Quincke's method.
11. Dispersive power of diffraction grating.
12. Verification of laws of stretched string – Sonometer.
13. Resolving power of grating.
14. Determination of Hall voltage and Hall coefficients of a given semiconductor using Hall effect.
15. Variation of dielectric constant with temperature.

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Text book:**

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017

**Course outcomes:**

- CO1: Handle optical instruments like microscope and spectrometer  
CO2: Determine thickness of a hair/paper with the concept of interference  
CO3: Estimate the wavelength and resolving power of different colors using diffraction grating  
CO4: Demonstrate the elastic response of loaded beams; estimate the frequency of a vibrating system using standing wave pattern.  
CO5: Estimate the strength of the magnetic field due to a current carrying coil.  
CO6: Estimate the mechanical properties of materials.

\*\*\*\*\*

**ENGINEERING WORK SHOP AND IT WORK SHOP****ENGINEERING WORK SHOP:****Course Objectives:**

- To familiarize with the basics of tools and equipments used in fitting, carpentry, Sheet metal and smithy.
- To familiarize with the production of simple modes in the above trades.

**NOTE: At least one exercise to be done from each trade.**

**Trade: Carpentry:**

1. Cross –Lap joint
2. Mortise and Tenon joint
3. T-Lap joint

**FITTING:**

1. V-fit
2. Square fit
3. Dovetail fit

**Black Smithy:**

1. S-Hook
2. Round rod to square
3. Round rod to Hexagonal headed bolt
4. Making simple parts like chisel.

**House Wiring:**

1. Parallel/Series connection of three bulbs
2. Stair Case wiring
3. Florescent lamp fitting
4. Measurement of earth resistance

**Tin Smithy:**

1. Making rectangular tray
2. Making scoop
3. Making hopper
4. Making funnel

**IT WORK SHOP:****Course Objectives:**

- IT Workshop is to impart basic computer usage and maintenance skills and to introduce you to a suite of productivity tools that will aid in your day to day activities.
- IT workshop works in a learning-by-doing mode. It concentrates more on hands-on experience for the participants rather theoretical classes.
- It enables the participant to make the best use of Microsoft Office Suite in their day-to-day requirements and make use of it to improve the standards in the educational environment.
- The IT Workshop prepares the participant to have a hands-on experience in maintaining and troubleshooting a PC by themselves.

Task1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your

instructor

Task2: Every student should individually install MS windows on the personal computer.

Task3: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals.

Task 4: Word Orientation: an overview of Microsoft (MS) office 2007/ 10: Importance of MS office 2007/10, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Task 5: Excel Orientation: The importance of MS office 2007/10 tool Excel as a Spreadsheet tool, Accessing, overview of toolbars, saving excel files, Using help and resources. Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Task 6: Basic power point utilities and tools which helpful to create basic power point presentation. Topic covered during this includes PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both Latex and Power point.

Task 7: Introduction to HTML &Basic syntax of html Attributes, elements, lists, and basic programs, Homepage using HTML Consisting of photo, name, address and education details as a table.

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

#### **Course Outcomes:**

Upon completion of the course, the student will be able to

CO1: Identify the peripherals, components of CPU along with the functions of CPU.

CO2: Implement the installation of Windows OS and explain about Hardware Troubleshooting.

CO3: Create HTML Homepage and use MS Office like Word, Excel and Power Point Presentation.

CO4: Apply basic Electrical Engineering knowledge for House-wiring Practice.

CO5: Make different components using Fitting and Carpentry.

CO6: Prepare simple jobs as per specifications using Tinsmithy tools and Blacksmithy Tools.

\*\*\*\*\*

I Year - I Semester

Course Code : UR19MC202

L	T	P	C
0	0	0	0

Internal: 20 Marks

External: 0 Marks

Semester-end: 30 Marks

## **APPLIED PHYSICS - VIRTUAL LAB**

**(Any 3 of the following listed 12 experiments)**

### **Course objectives:**

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.

### **LIST OF EXPERIMENTS**

1. Hall Effect
2. Crystal Structure
3. Brewster's angle
4. Numerical Aperture of Optical fiber
5. Photoelectric Effect
6. LASER – Beam Divergence and Spot size
7. Michelson's interferometer
8. Black body radiation
9. Flywheel –moment of inertia
10. AC Sonometer
11. Resistivity by four probe method
12. Newton's rings –Refractive index of liquid

**URL: [www.vlab.co.in](http://www.vlab.co.in)**

### **Course outcomes:**

CO1: Handle optical instruments like microscope and spectrometer

CO2: Determine thickness of a hair/paper with the concept of interference

\*\*\*\*\*

**PROFESSIONAL ENGLISH**

(Common to all branches)

**Course Objectives:**

- Recall and improve the language proficiency of the students in English
- Paraphrase and interpret the ideas and thoughts in a dynamic way
- Prioritize the importance of practical learning of English
- Distinguish the various levels of Listening, Speaking, Reading and writing skills
- Construct statements in writing and speaking in professional manner

**UNIT – I****Poem:** "Enterprise" byNissim Ezekiel **Grammar:**

Types of Sentences

**Vocabulary:** Synonyms**Writing:** Essay Writing**Life-Skills:** Values and Ethics**UNIT – II****Text:** Like a tree, unbowed:Wangari Maathai **Grammar:** Active Voice& Passive Voice **Vocabulary:** Antonyms**Writing:** Technical Report Writing **Life-Skills:** Time Management**UNIT – III****Text:** Stay Hungry – Stay Foolish**Grammar:** Common Errors in Articles and Prepositions**Vocabulary:** Words Often Confused**Writing:** Describing People, Places, Objects, Events**Life-Skills:** Motivation**UNIT – IV****Story:** The Cop and the Anthem by O. Henry**Grammar:** Common Errors in Subject – Verb agreement**Vocabulary:** Technical Vocabulary**Writing:** Note-Making **Life-Skills:** Rapid Reading



## **UNIT – V**

**Short Story:** “A Village School Master” by Oliver Gold Smith

**Grammar:** Common Errors

**Vocabulary:** GRE Word List

**Writing:** Precise Writing / Information Article

**Life-Skills:** Career Planning

### **TEXT BOOK:**

1. ‘InfoTech English’ – Maruti Publications

### **REFERENCE BOOKS:**

1. Raymond Murphy, “Murphy’s Essential English Grammar” with CD, Cambridge University Press.
2. Practical English Usage, Michael Swan, OUP, 1995
3. Remedial English Grammar, F.T. Wood, Macmillan, 2007

### **Course Outcomes:**

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

**CO1:** Apply critical thinking to develop writing skills

**CO2:** Evaluate common errors in grammar

**CO3:** Describe distinct literary characteristics of poems

**CO4:** Analyze the characteristics of one-act-plays

**CO5:** Develop correspondence skills and promotional writing skills

**CO6:** Evaluate the importance of values and ethics for career planning.

\*\*\*\*\*

Internal: 30 Marks

External: 70 Marks

**DIFFERENTIAL EQUATIONS & VECTOR CALCULUS**

(Common to all branches)

**Course Objectives:**

- To enlighten the learners in the concept of differential equations.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

**UNIT – I**

**Linear Differential Equations of Higher Order:** Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral with RHS of the forms  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ ,  $x^n$ ,  $e^{ax}.V$  and  $xV$ . L-C-R Circuit problems.

**UNIT – II**

**First order Partial Differential Equations:** Formation of PDE, solutions of Lagrange's linear equation Method of grouping – Method of multipliers, Solution of non-linear PDEs of the forms  $f(p,q)=0$ ,  $f(z,p,q)=0$ ,  $f(x,p)=g(y,q)$ ,  $Z=px+qy+f(p,q)$ .

**UNIT – III**

**Applications of Partial Differential Equations:** Method of Separation of variables-One dimensional Wave equation-Two dimensional Heat equation, Laplace equation.

**UNIT – IV**

**Vector Differential Calculus:** Scalar and vector point functions, Gradient, Directional derivative. Divergence, Curl, Physical interpretation of operators.

**UNIT – V**

**Vector Integral Calculus:** Line integral-work done, surface and volume integrals, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof).

**TEXT BOOK:**

1. Higher Engineering Mathematics, B. S. Grewal.

**REFERENCE BOOKS:**

1. Advance Engineering in Mathematics, Erwin Kreyszig.
2. Vector calculus, Schaum's series.

**Course Outcomes:**

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

**CO1:** Solve the differential equations related to various engineering fields.

**CO2:** Identify solution methods for partial differential equations that model physical processes.

**CO3:** Apply a range of techniques to find solutions of standard PDEs .

**CO4:** Classify the nature of the partial differential equations.

**CO5:** Interpret the physical meaning of different operators such as gradient, curl and divergence.

**CO6:** Estimate the work done against a field and circulation using vector calculus.

\*\*\*\*\*

**NUMERICAL METHODS&TRANSFORMS**  
(ECE/EEE)

**Course Objectives:**

- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To familiarize the students with numerical methods of solving the non-linear equations.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

**UNIT – I**

**Solution to algebraic equations:** Solution of polynomial and transcendental equations: Bisection method, Regula-Falsi method, Iteration method, Newton-Raphson method.

**UNIT – II**

**Interpolation:** Finite differences, interpolation using Newton's forward and backward difference formulae, Gauss forward and backward interpolation formulae, Interpolation with unequal intervals, Newton's divided difference and Lagrange's formulae.

**UNIT – III**

**Numerical integration and Solution of ODE:** Numerical integration- trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations, Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first order ODE.

**UNIT – IV**

**Laplace Transforms :** Laplace transforms of elementary functions, Properties of Laplace Transforms of derivatives and integrals, Multiplication by t, Division by t, Inverse transforms, Method of Partial fractions, Applications of Ordinary differential equations.

**UNIT – V**

**Fourier Transforms:** Fourier integral theorem (without proof), Fourier sine and cosine integral, Fourier transforms, Fourier sine and cosine transforms, Properties of Fourier transforms.

**TEXT BOOK:**

Higher Engineering Mathematics, B.S. Grewal.

**REFERENCE BOOKS:**

1. Advanced Engineering Mathematics, Erwin kreyszig,
2. Introductory methods of Numerical Analysis by S.S.Sastri

**NPTEL ONLINE COURSE:****Course Outcomes:**

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

**CO1:** Evaluate approximating the roots of polynomial and transcendental equations by different Algorithms.

**CO2:** Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal Intervals.

**CO3:**Apply definite integral of a function by using different numerical methods.

**CO4:**Solve different algorithms for approximating the solutions of ordinary differential equations to its analytical computations.

**CO5:**Explain the Laplace and Inverse Laplace Transform for different types of functions and Evaluate ordinary differential equations using Laplace transform technique.

**CO6:**Apply integral expressions for the forwards and inverse Fourier transform to a range of non – periodic waveforms .

\*\*\*\*\*

**APPLIED CHEMISTRY  
(EEE & ECE)****Course Objectives:**

- Importance of usage of Plastics in household appliances and composites (FRP) in aerospace automotive industries.
- Select the fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- Constructions of galvanic cells as well as some batteries used in instruments are introduced. Understand the mechanism of corrosion which itself is explained by electrochemical theory
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Explain the computational chemistry and different applications of analytical instruments.

**UNIT – I****HIGH POLYMERS AND PLASTICS**

**Polymerisation** : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4 techniques)- Preparation, properties and applications of Polyethylene, PVC, Bakelite and Teflon Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers. Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

**UNIT – II****FUEL TECHNOLOGY**

**Fuels**:- Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knocking agents – Power alcohol – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

**UNIT – III****ELECTROCHEMICAL CELLS AND CORROSION****Part-A:****ELECTROCHEMISTRY**

Introduction- Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electrochemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell –Lead-Acid storage cells-Li cells. Fuel cells: - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells.

**Part-B****CORROSION**

Corrosion:- Definition – Theories of Corrosion (electrochemical and chemical)-Galvanic corrosion,Differential aeration corrosion –Factors which influence the rate of corrosion - Protection from corrosion– Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

#### **UNIT – IV**

##### **CHEMISTRY OF ADVANCED ENGINEERING MATERIALS**

**Nano materials**:- Introduction–Sol-gel method & chemical reduction method of preparation - Carbon nano tubes-Preparation and Applications;**Solar Energy**:- Introduction, application of solar energy, photovoltaic cell: design, working and its importance **Liquid Crystals** :- Types and applications **Non-Elemental Semiconducting Materials**:-Stoichiometric, Controlled valency&Chalcogen photo/semiconductors, Preparation of Semiconductors(Distillation,Zonerefining,Czochralski crystal pulling,epitaxy,diffusion,ion implantation) **Superconductors** :- Type-I & Type-2, properties &applications.

#### **UNIT – V**

##### **COMPUTATIONAL CHEMISTRY AND SPECTROSCOPIC STUDIES**

**COMPUTATIONAL CHEMISTRY**: Introduction,Ab Initio studies.

**SPECTROSCOPIC STUDIES**: Electromagnetic spectrum-UV(laws of absorption,instrumentation,theory of electronic spectroscopy, Frank-condon principle,chromophores and auxochromes,intensity shifts,applications),X-Ray diffraction method , FT-IR(Instrumentation and IR of some organic compounds,applications)-MRI and CT scan(Procedure & Applications).

#### **TEXT BOOKS:**

- 1.Engineering Chemistry by Jain and Jain; Dhanpat Rai Publishing Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

#### **REFERENCE BOOKS:**

- 1.Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM.

#### **Course Outcomes:**

Upon completion of this course, the students will be able to

**CO1:** Understand the advantages and limitations of plastic materials.

**CO2:** Describe the need of fuels as a source of energy.

**CO3:** Explain the theory of construction of batteries.

**CO4:** Study some methods of corrosion control and Categorize the reasons for corrosion.

**CO5:** Generalize the importance of advanced engineering materials like Nanomaterials, Liquid Crystals, Principles of Green chemistry, Refractories and Cementing materials.

**CO6:** Obtain the knowledge of computational chemistry and understand the principles of different analytical instruments.

\*\*\*\*\*

I Year - II Semester

Course Code : UR19ESC202

L	T	P	C
3	0	0	3

Internal: 30 Marks

External: 70 Marks

### **ELECTRICAL CIRCUIT ANALYSIS-I**

(EEE)

#### **Course Objectives:**

- To study the concepts of passive elements, types of sources and various network reduction techniques.
- To understand the applications of network topology to electrical circuits.
- To study the concept of magnetic coupled circuit.
- To understand the behavior of RLC networks for sinusoidal excitations.
- To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
- To understand the applications of network theorems for analysis of electrical networks.

#### **UNIT – I**

**Introduction to Electrical Circuits:** Passive components and their V-I relations. Sources (dependent and independent) -Kirchoff's laws, Network reduction techniques. source transformation technique, nodal analysis and mesh analysis..

#### **UNIT – II**

**Network topology:** Definitions of Graph and Tree, Basic cutset and tieset matrices for planar networks, Loop and nodal methods of analysis of networks with independent voltage and current sources, Duality and Dual networks.

#### **UNIT – III**

**Magnetic Circuits:** Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits. Faraday's laws of electromagnetic induction Concept of self and mutual inductance. Dot convention-coefficient of coupling

**Single Phase A.C Systems:** Periodic waveforms -Concept of phase angle and phase difference – Waveforms and phasor diagrams for lagging, leading networks. Complex and polar forms of representations, steady state analysis of R, L and C circuits. Power Factor and its significance real, reactive power and apparent power, waveform of instantaneous power triangle and complex power.

#### **UNIT – IV**

**Analysis of AC Networks:** Extension of node and mesh analysis to AC networks, Numerical problems on sinusoidal steady state analysis, Series and parallel resonance, selectively band width and Quasi factor.

#### **UNIT – V**

**Network theorems (DC & AC Excitations):** Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem .

#### **TEXT BOOK:**

1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, McGraw Hill Company, 6th edition
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd



**REFERENCE BOOKS:**

1. Fundamentals of Electrical Circuits by Charles K. Alexander and Mathew N.O. Sadiku, McGraw Hill Education (India)
2. Electric Circuits by David A. Bell, Oxford publications
3. Introductory Circuit Analysis by Robert L. Boylestad, Pearson Publications
4. Circuit Theory (Analysis and Synthesis) by A. Chakrabarti, Dhanpat Rai & Co.

**NPTEL ONLINE COURSE:****Course Outcomes:**

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

**CO1:** Design various electrical networks in presence of active and passive elements.

**CO2:** Express electrical networks with network topology concepts.

**CO3:** Judge any magnetic circuit with various dot conventions.

**CO4:** Identify any R, L, C network with sinusoidal excitation.

**CO5:** Memorize any R, L, network with variation of any one of the parameters i.e. R, L, C, and  $f$ .

**CO6:** Identify electrical networks by using principles of network theorems.

\*\*\*\*\*

**I Year - II Semester**

**Course Code : UR19ESC210**

L	T	P	C
3	0	0	3

Internal: 30 Marks

External: 70 Marks

**Problem Solving and Programming Using C  
(CE/EEE/ECE/CSE/IT)**

**Course Objectives:**

- The objectives of this course are to make the student familiar with 'problem solving using computers, development of algorithms, usage of basic flowchart symbols and designing flowcharts.
- The students can also understand programming language basic concepts, reading and displaying the data, earn the programming skills using selection, iterative control structures, functions, arrays, pointers and files. After completion of this course the student is expected to analyze the real life problem and write programs in C language to solve the problems.

**UNIT – I INTRODUCTION**

Problem Solving: Problem solving aspects, Problem solving techniques, Computer as a Problem solving tool, Algorithms-definition, features, criteria. Flowchart-definition, basic symbols, sample flowcharts. Top down design, Implementation of program verification, The efficiency of algorithms, Analysis of algorithms, computational complexity of algorithm, order(O) notation, Worst case & Average case Analysis.

**UNIT – II**

Basics of C programming language: Introduction to C, structure of a C program, basic data types and sizes, constants, variables, unary, binary and ternary operators, expressions, type conversions, conditional expressions, precedence and order of evaluation, Input and Output statements, Sample Programs.

SELECTION-DECISION MAKING CONDITIONAL CONTROL STRUCTURES: simple-if, if- else, nested if-else, if- else ladder and switch-case.

ITERATIVE: while-loop, do-while loop and for loop control structures, goto, break and continue statements. Sample Programs.

**UNIT – III**

FUNCTIONS-basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for Fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs :

ARRAYS-concepts, declaration, definition, accessing elements, storing 'elements, 1-D arrays, 2-D arrays and character arrays, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix, Passing 1-D arrays, 2-D arrays to functions, Strings and String Manipulations

**UNIT – IV**

POINTERS-pointers concepts, initialization of pointer variables, pointers and function

arguments, passing by address-dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and -multi-dimensional arrays, dynamic memory management functions, command line arguments

#### **UNIT – V**

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing 'structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications

FILEHANDLING: Concept of a file, text files and binary files, Formatted I/O, File I/O operations

#### **TEXT BOOKS:**

1. How to Solve it by Computer, R. G. Dromey, Pearson Education, 2019
2. Programming in C, Ashok N Kamthane, Amit Ashok Kamthane, 3rd Edition, Pearson Education, 2019

#### **Reference Books:**

1. The C programming Language by Dennis Richie and Brian Kernighan
2. Programming in C, Reema Thareja, OXFORD
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, Cengage

#### **Course Outcomes:**

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

**CO1:** Design efficient algorithm for solving a problem.

**CO2:** Identify various constructs of C programming language efficiently.

**CO3:** Apply programs using modular approach such as functions.

**CO4:** Create programs to perform matrix and mathematical applications.

**CO5:** Understand dynamic memory management and problems using pointers and solving the problems.

**CO6:** Develop real life applications using structures and also learn about handling the files for storing the data permanently.

\*\*\*\*\*

Internal: 20 Marks

External: 30 Marks

**PROFESSIONAL ENGLISH LAB**

(Common to all branches)

**Course Objectives:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

**List of activities:**

- 1) Body Language: facial expressions, body posture, gestures
- 2) Body Language: eye movement, touch and the use of space
- 3) JAM
- 4) Extempore
- 5) Debate: Lincoln-Douglas debate and dos and don'ts
- 6) Debate: Formal and Informal debate
- 7) Interview Skills: Formal and Informal Interview
- 8) Interview Skills: Telephonic interview
- 9) Group Discussion: Dos and don'ts, general topics
- 10) Group Discussion: Science and technical topics
- 11) Presentation: Elimination of stage fear and preparation
- 12) Presentation on general topics
- 13) Presentation: using ppt or visual aids.

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Reference Manuals:**

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd 'Strengthen Your Communication Skills' published by Maruthi Publications

**Course Outcomes:**

Upon Completion of the course, the student will be able to:

- CO1 Understand different types of body language
- CO2 Develop communication skills through various language activities
- CO3 Apply critical thinking to get main ideas for debate
- CO4 Develop audacity to face an interview
- CO5 Build knowledge for discussing topics effectively
- CO6 Analyze a topic by making a presentation

\*\*\*\*\*

Internal: 20 Marks

External: 30 Marks

**Engineering and Applied Chemistry Lab****Course objectives:**

- To gain practical knowledge by applying the experimental methods to correlate with the chemistry theory.
- To learn the usage of electrical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.

**List of Experiments**

1. Introduction to Chemistry laboratory-Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Qualitative analysis, Quantitative analysis etc.
2. Trial experiment-Estimation of HCl by using standard  $\text{Na}_2\text{CO}_3$  solution.
3. Estimation of Total hardness of water by using standard EDTA solution.
4. Estimation of Zinc using standard EDTA solution.
5. Estimation of Copper using standard EDTA solution.
6. Estimation of  $\text{pH}$  of the given sample solution using  $\text{pH}$  meter.
7. Conductometric titration between Strong acid and Strong base.
8. Conductometric titration between Strong acid and Weak base.
9. Potentiometric titration between Strong acid and Strong base.
10. Potentiometric titration between Strong acid and Weak base.
11. Estimation of  $\text{KMnO}_4$  using standard Oxalic acid.
12. Determination of Alkalinity of water.
13. Determination of Viscosity of given sample by Ostwald viscometer.
14. Estimation of Ferric iron using standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution.
15. Estimation of Copper using standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution.
16. Preparation of Bakelite (Demo).

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Course Outcomes:**

Upon Completion of the course, the student will be able to

- CO1: Utilize different Analytical tools and execute experiments involving estimation of raw materials, finished products and environmental samples etc.
- CO2: Utilize modern instruments like Conductometer, pH meter and Potentiometer for the analysis of samples.
- CO3: Determine the total hardness present in water for its quality in drinking purpose.
- CO4: Estimate the Viscosity of oil and assess its suitability as a lubricant.
- CO5: Determine the alkalinity present in water for its quality in drinking purpose.
- CO6: Identify the adulteration of lemon juice for Vitamin-C.

**Reference Books**

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuri (2012) Laboratory Manual of engineering chemistry-II, VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication.

\*\*\*\*\*

### Problem Solving and Programming using C Lab

#### Course Objectives:

- Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

#### Exercise 1

- Write a C Program to calculate the area of a triangle.
- Write a C program to find the largest of three numbers using ternary operator.
- Write a C Program to swap two numbers without using a temporary variable.

#### Exercise 2

- Write a C program to find the 2's complement of a binary number.
- Write a C program to find the roots of a quadratic equation.
- Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)

#### Exercise 3

- Write a C program to find the sum of individual digits of a positive integer and, also, find 'the reverse of the given number.
- Write a C program to generate the first n terms of the Fibonacci sequence.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

#### Exercise 4

- Write a C Program to print the multiplication table of a given number.
- Write a C Program to read a decimal number and find its equivalent binary number.
- Write a C Program to check whether the given number is Armstrong number or not.

#### Exercise 5

- Write a C program to interchange the largest and smallest numbers in the given array.
- Write a C program to implement a linear search on a given set of values.
- Write a C program to implement binary search on a given set of values.

#### Exercise 6

- Write a C program to implement sorting of an array of elements.
- Write a C program to input two m x n matrices, check the compatibility and perform 'addition and multiplication of them.

**Exercise 7**

Write a C program that uses functions to perform the following operations:

- i. To insert a sub-string into given main string at a given position.
- ii. To delete n characters from a given position in a given string.
- iii. To replace a character of string either from beginning or ending or at a specified location.

**Exercise 8**

Write a C program that uses functions to perform the following operations using Structure:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

**Exercise 9**

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings to append a string to another string
- to compare two strings

**Exercise 10**

- a) Write C Program to find the number of characters in a given string including and excluding spaces.
- b) Write C Program to copy the contents of one string to another string without using string handling functions.
- c) Write C Program to find whether a given string is palindrome or not.
- d) Write a C program to find both the largest and smallest number of an array of integers using call by value and call by reference.

**Exercise 11**

Write a C program using recursion for the following:

- a) To display sum of digits of given number
- b) To find the factorial of a given integer
- c) To find the GCD (greatest common divisor) of two given integers.
- d) To find Fibonacci sequence

**Exercise 12**

- a) Write C Program to reverse a string using pointers
- b) Write a C Program to compare two 2D arrays using pointers
- c) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

**Exercise 13**

Examples which explores the use of structures, union and other user defined variables.

**Exercise 14**

- a) Write a C program. which copies one file to another.
- b) Write a C program to count the number of characters and number of lines in a file.
- c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Course Outcomes:**

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

CO1: Apply and practice logical ability to solve the problems.

CO2: Identify C programming development environment, compiling, debugging, and linking and executing a program using the development environment.

CO3: Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.

CO4: Apply the in-built functions and customized functions for solving the problems.

CO5: Create C programs using pointers, memory allocation techniques.

CO6: Use files for dealing with variety of problems.

\*\*\*\*\*



## ENGINEERING EXPLORATION PROJECT

### COURSE OBJECTIVES:

- Build mindsets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand their real-world applications
- Use Design Thinking for problem solving methodology for investigating illdefined problems.
- Undergo several design challenges and work towards the final design challenge.

### Apply Design thinking on the following Streams to

- Project Stream 1: Electronics, Robotics, IOT and Sensors
- Project Stream 2: Computer Science and IT Applications
- Project Stream 3: Mechanical and Electrical tools
- Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

### HOW TO PURSUE THE PROJECT WORK?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human-centered design.
- The class will then divide into teams and they will be working with one another for about 2 – 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- The teams start with **Design Challenge** and go through all the phases more in depth from coming up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

### TASKS TO BE DONE:

#### Task 1: Everyone is a Designer

- Understand class objectives & harness the designer mindset

#### Task 2: The Wallet/Bag Challenge and Podcast

- Gain a quick introduction to the design thinking methodology
- Go through all stages of the methodology through a simple design challenge
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

**Task 3: Teams & Problems**

- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems.

**Task 4: Empathizing**

- Continue Design Challenge and learn empathy
- Learn techniques on how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

**Task 5: Ideating**

- Continue Design Challenge and learn how to brainstorm effectively
- Encourage exploration and foster spaces for brainstorming
- Submit Activity Card

**Task 6: Prototyping**

- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use them as communication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

**Task 7: Testing**

- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual and group performance
- Submit Activity Card

**Task 8:**

- Final Report Submission and Presentation

**Note:** The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

**REFERENCES:**

1. Tom Kelly, *The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm* (Profile Books, 2002)
2. Tim Brown, *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation* (HarperBusiness, 2009)
3. Jeanne Liedtka, Randy Salzman, and Daisy Azer, *Design Thinking for the Greater Good: Innovation in the Social Sector* (Columbia Business School Publishing, 2017)

**OTHER USEFUL DESIGN THINKING FRAMEWORKS AND METHODOLOGIES:**

- Human-Centered Design Toolkit (IDEO); <https://www.ideo.com/post/design-kit>
- Design Thinking Boot Camp Bootleg (Stanford D-School); <https://dschool.stanford.edu/resources/the-bootcamp-bootleg>
- Collective Action Toolkit (frogdesign); [https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT\\_2.0\\_English.pdf](https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf)
- Design Thinking for Educators (IDEO); <https://designthinkingforeducators.com/>

**CONSTITUTION OF INDIA**

(CE,EEE, ME &amp; ECE)

**Course Objectives:**

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative.

**UNIT – I**

**Introduction to Indian Constitution:** Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

**UNIT – II**

**Union Government and its Administration Structure of the Indian Union:** Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

**UNIT – III**

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

**UNIT – IV**

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

**UNIT – V**

**Election Commission:** Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women.

**TEXT BOOKS:**

1. Subash Kashyap, Indian Constitution, National Book Trust
2. J.A. Siwach, Dynamics of Indian Government & Politics

**REFERENCE BOOKS:**

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. D.C. Gupta, Indian Government and Politics
3. H.M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

- 4.J.C. Johari, Indian Government and Politics Hans
- 5.J. Raj Indian Government and Politics
- 6.M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
- 7.Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012.

#### **NPTEL ONLINE COURSE:**

#### **Course Outcomes:**

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

- CO1: Explain the concept of Indian constitution and Evaluate Preamble Fundamental Rights and Duties
- CO2: Judge the structure of Indian government, Differentiate between the state and central government.
- CO3: Explain the role of President and Prime Minister and Know the Structure of Supreme Court and High court.
- CO4: Analyze the role Governor and Chief Minister and explain the role of state Secretariat
- CO5: Explain the role of Mayor and elected representatives of Municipalities, Evaluate Zilla Panchayat block level organization
- CO6: Identify the roles of Election Commission apply knowledge and Evaluate various commissions of viz SC/ST/OBC and women.

\*\*\*\*\*

**USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY**

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

**I B. Tech I Semester Regular Examinations, Jan-2020****UR19HM101: COMMUNICATIVE ENGLISH**

(Common to ALL Branches)

Time: 3 hours

Max. Marks: 5x14 = 70

*Answer either A or B from each Question. All Questions carry equal marks*

- 
- 1.A. i)** What is the theme of the poem, 'Life'? **7M (BL2)**  
**ii)** Write a paragraph on 'Eradication of Corruption in India'. **7M (BL6)**  
**OR**
- 1.B. i)** How does Sarojini Naidu depict the life of children in the poem, 'Life'? **7M (BL2)**  
**ii)** What are the ways to develop positive attitude? **7M (BL6)**
- 2.A. i)** What could be the reason for the drawer remaining locked for close to 25 years? **7M (BL2)**  
**ii)** Write a letter to the Sub-Inspector of police of your area complaining about the loss of your purse. **7M (BL6)**  
**OR**
- 2.B. i)** How does the writer support her statement that the 1990's had a fine balancing act in the lesson 'A Drawer full of happiness'? **7M (BL2)**  
**ii)** How do you improve self management skills? **7M (BL6)**
- 3.A. i)** Half a rupee worth ---Justify the title **7M (BL5)**  
**ii)** Explain non-verbal communication in detail? **7M (BL4)**  
**OR**
- 3.B. i)** Describe Subbaiah's Character in 'Half a rupee Worth'. **7M (BL1)**  
**ii)** What are the steps to be more assertive? **7M (BL4)**
- 4.A. i)** Discuss Turning point with reference to Prof. Stephen Hawking's life. **7M (BL2)**  
**ii)** Explain the ways of behavior in assertive people? **7M (BL4)**  
**OR**
- 4.B. i)** What are the greatest contributions to Science by Prof. Hawking? **7M (BL1)**  
**ii)** Write a speech on "Independence Day". **7M (BL6)**
- 5.A. i)** Justify the title of the poem 'Once Upon a Time'. **7M (BL5)**  
**ii)** Write an email to your classmate regarding intra-college quiz competition to be held at Usha Rama College of Engineering. **7M (BL6)**  
**OR**
- 5.B. i)** What is the relationship between the narrator and the listener in the poem 'Once Upon a Time'? **7M (BL2)**  
**ii)** What are the steps to 'Setting a Goal'? **7M (BL4)**

\*\*\*\*\*

**USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY**

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

**I B. Tech I Semester Regular Examinations, Jan-2020****UR19BSC101: LINEAR ALGEBRA & CALCULUS**

(Common to ALL Branches)

Time: 3 hours

Max. Marks: 5x14 = 70

*Answer either A or B from each Question. All Questions carry equal marks*

- 1.A. i)** Solve  $10x - 7y + 3z + 5u = 6$ ,  $-6x + 8y - z - 4u = 5$ ,  $3x + y + 4z + 11u = 2$ ,  $5x - 9y - 2z + 4u = 7$  by Gauss elimination method. **7M (BL3)**

- ii)** Find the eigen values and eigen vectors of the matrix  $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$  **7M (BL5)**

**OR**

- 1.B. i)** Show that the sum of the eigen values of a matrix is its trace. **5M (BL2)**

- ii)** Verify Cayley-Hamilton theorem, hence find the inverse of  $A = \begin{bmatrix} 3 & 2 & 4 \\ 4 & 3 & 2 \\ 2 & 4 & 3 \end{bmatrix}$  **9M (BL3)**

- 2.A. i)** Test for convergence of the series  $\sum_{n=2}^{\infty} \frac{x^n}{n(n-1)(n-2)}$  **7M (BL3)**

- ii)** Discuss the convergence of  $\sum \left( \frac{n}{n+1} \right)^{n^2}$  **7M (BL3)**

**OR**

- 2.B. i)** Obtain the Fourier series for  $f(x) = e^{-x}$  in the interval  $0 < x < 2\pi$  **7M (BL2)**

- ii)** Find a Fourier series to represent  $x^2$  in the interval  $(-\pi, \pi)$  **7M (BL2)**

- 3.A. i)** Verify Rolle's theorem for  $f(x) = (x-a)^m(x-b)^n$  where m, n are positive integers. **7M (BL3)**

- ii)** Verify Lagrange's mean value theorem for  $(x-1)(x-2)(x-3)$  in  $[0, 4]$  **7M (BL3)**

**OR**

- 3.B. i)** Verify Maclaurin's theorem for  $f(x) = (1-x)^{5/2}$  with lagrange's form of remainder. **7M (BL3)**

- ii)** Find the value of 'c' by Cauchy's mean value theorem for  $\sin x$  and  $\cos x$  in  $(0, \pi)$  **7M (BL3)**

- 4.A. i)** If  $u = \tan^{-1}(y/x)$  where  $x = e^t - e^{-t}$  and  $y = e^t + e^{-t}$  find  $du/dt$ . **7M (BL5)**

- ii)** If  $u = F(x-y, y-z, z-x)$  prove that  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$  **7M (BL2)**

**OR**

- 4.B. i)** Show that  $u = x\sqrt{1-y^2} + y\sqrt{1-x^2}$ ,  $v = \sin^{-1}x + \sin^{-1}y$  are functionally related and find the relationship. **7M (BL2)**

- ii)** Discuss the maxima and minima of  $f(x, y) = x^3y^2(1-x-y)$  **7M (BL2)**

**5.A. i)** Evaluate  $\iint_A xy dx dy$  where A is the domain bounded by x-axis, ordinate  $x = 2a$  and the curve  $x^2 = 4ay$ . **7M (BL5)**

**ii)** Change of order of integration, evaluate  $\int_0^{4a} \int_{x^2/4}^{2\sqrt{ax}} dy dx$  **7M (BL5)**

**OR**

**5.B. i)** Evaluate  $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x + y + z) dx dy dz$  **7M (BL5)**

**ii)** Find the volume bounded by the cylinder  $x^2 + y^2 = 4$  and the planes  $y + z = 4$  and  $z = 0$ . **7M (BL4)**

\*\*\*\*\*

**USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY**

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

**I B. Tech I Semester Regular Examinations, Jan-2020****UR19BSC108: APPLIED PHYSICS**

(EEE &amp; ECE)

Time: 3 hours

Max. Marks:  $5 \times 14 = 70$ *Answer either A or B from each Question. All Questions carry equal marks*

- 
- 1.A. i)** What are necessary conditions for obtaining interference of fringes? **4M (BL1)**  
**ii)** With ray diagram discuss the theory of thin films and derive the condition for constructive and destructive interference in reflected light. **10M (BL2)**

**OR**

- 1.B. i)** Explain with theory the Fraunhofer diffraction at a single slit. **10M (BL2)**  
**ii)** Calculate the possible order of spectra with a plane transmission grating having 18,000 lines per inch when light of wavelength  $4500\text{\AA}$  is used. **4M (BL5)**

- 2.A. i)** Describe Davisson and Germer's experiment in support of the existence of matter waves. **10M (BL3)**  
**ii)** Compute the de-Broglie wavelength of an electron whose kinetic energy is 10eV. **4M (BL5)**

**OR**

- 2.B. i)** State and explain Heisenberg's uncertainty principle. **4M (BL2)**  
**ii)** Obtain an expression for energy levels of an electron in a one dimensional potential well of infinite height. **10M (BL5)**

- 3.A. i)** What are the merits and demerits of classical free electron theory? **6M (BL1)**  
**ii)** Derive an expression for density of states based on quantum free electron theory. **8M (BL3)**

**OR**

- 3.B. i)** How does the band theory of solids lead to the classification of solids into conductors, Semiconductors and insulators? **6M (BL1)**  
**ii)** Explain the concept of effective mass of an electron. **8M (BL2)**

- 4.A. i)** Draw the diagram to show the variation of the Fermi level with temperature in Intrinsic Semiconductor. **4M (BL3)**  
**ii)** Derive an expression for density of charge carriers in an extrinsic n-type Semiconductor. **10M (BL5)**

**OR**

- 4.B. i)** Explain Hall Effect and derive an expression for Hall coefficient. Give any two of its Applications. **8M (BL2)**  
**ii)** Define Drift and Diffusion currents and obtain the relation between mobility and Diffusion coefficient **6M (BL4)**

- 5.A. i)** Explain the origin of magnetism in materials and derive expression for magnetic moment **7M (BL2)**  
**ii)** Draw and explain B-H curve for a ferromagnetic material placed in a magnetic field. **7M (BL4)**

**OR**

- 5.B. i)** Derive an expression for internal field in a dielectric placed in field E **8M (BL5)**  
**ii)** Obtain Clausius-Mossotti equation **6M (BL5)**

\*\*\*\*\*



**USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY**

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

**I B. Tech I Semester Regular Examinations, Jan-2020****UR19ESC108: ENGINEERING GRAPHICS AND DRAFTING**

(CIVIL / EEE / ECE)

Time: 3 hours

Max. Marks: 5x14 = 70

*Answer either A or B from each Question. All Questions carry equal marks*

- 
- 1.A. i)** Draw regular pentagon, hexagon and a heptagon on a common edge of side 30mm. **6M (BL1)**  
**ii)** Construct a scale of 1:40 to read metres, decimeters and centimeters and long enough to measure up to 6 m. Mark a distance of 4.76 m on it. **8M (BL6)**

**OR**

- 1.B. i)** Inscribe the largest possible ellipse in a rectangle of sides 160 mm and 100 mm. **6M (BL2)**  
**ii)** The distance between two stations by road is 200 km and it is represented on a certain map by a 5 cm long line. Find the R.F and construct a diagonal scale showing single kilometer and long enough to measure up to 600 km. Show a distance of 467 km on this scale. **8M (BL3)**

- 2.A. i)** Two points P and Q lying in the VP are 90 mm apart. The horizontal distance between the points is 60 mm. if the point P is 15 mm above the HP. Find the height of the point Q above the HP and the inclination of the line joining P and Q with the HP. **6M (BL1)**

- ii)** A 60 mm long line AB is parallel to and 20 mm in front of the VP the ends A and B of the line are 10 mm and 50 mm above the HP, respectively. Draw the projections of the line and determine its inclination with the HP. **8M (BL5)**

**OR**

- 2.B. i)** A point U is 12 mm below HP, 25 mm behind VP and 38 mm away from Profile Plane. Draw front view, top view and left side view of the point. **6M (BL1)**

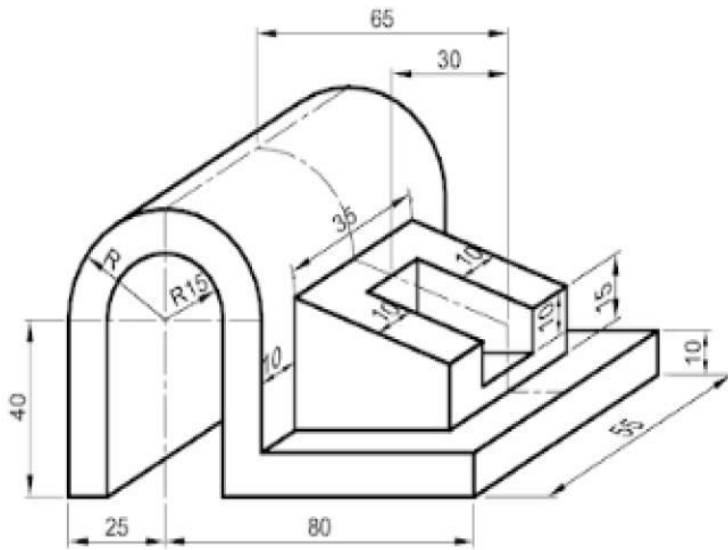
- ii)** An 80 mm long line PQ is inclined at 30° to the VP and is parallel to the HP. The end P of the line is 20 mm above the HP and 40 mm in front of the VP. Draw the projections of the line and determine its traces **8M (BL5)**

- 3.A. i)** A pentagon ABCDE of side 30 mm has its side AB in the VP and inclined at 30° to the HP and the corner B is 15 mm above the HP and the corner D is 30 mm in front of the VP. Draw the projections of the plane and find its inclination with the VP. **14M (BL1)**

**OR**

- 3.B. i)** A pentagonal prism, of base side 30 mm and axis 70 mm is resting on one of its rectangular faces in the VP. Draw its projections **14M (BL1)**

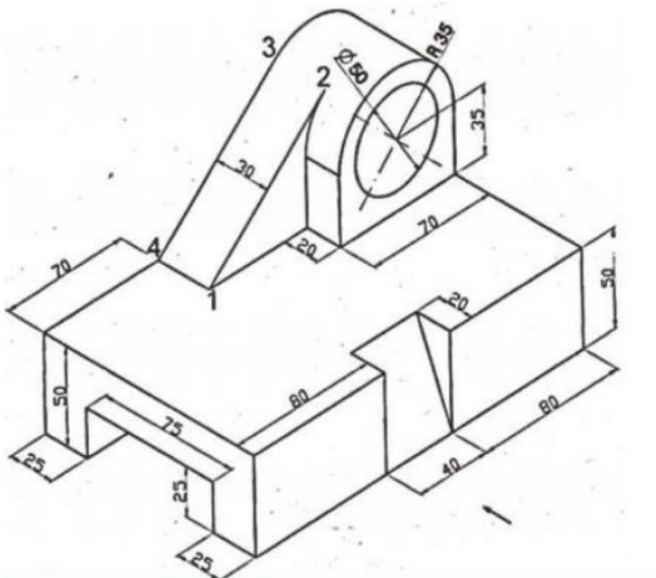
**4.A. i)** The front and top views of an object are shown in figure. Draw its isometric view.

**14M (BL1)**

**OR**

**4.B. i)** Convert the following isometric view in to orthographic views. All dimensions are in millimeters.

14M (BL2)



**5.A. i) State and explain various advantages & applications of computer aided drafting.**

14M (BL5)

OR

**5.B. i) Describe briefly various Display commands in AUTOCAD.**

**14M (BL2)**

\* \* \* \* \*

**USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY**

(An Autonomous College in the jurisdiction of JNTUK, Kakinada)

**I B. Tech I Semester Regular Examinations, Jan-2020****UR19ESC109: FUNDAMENTALS OF COMPUTER SCIENCE****(Common to EEE, CSE & IT)**

Time: 3 hours

Max. Marks: 5x14 = 70

*Answer either A or B from each Question. All Questions carry equal marks*

- 
- 1.A. i)** Explain the evolution of computers. Further state how computers in one generation or better than predecessors. **7M (BL2)**
- ii)** Distinguish between the machine, Assembly and High Level language programming. **7M (BL4)**
- OR**
- 1.B. i)** Explain various parts of a digital computer. **7M (BL2)**
- ii)** Explain the block diagram of a digital computer. **7M (BL2)**
- 2.A. i)** How to represent the fixed and floating point numbers in number system explain with examples. **8M (BL1)**
- ii)** Change the Decimal 987654 into Octal and Hexadecimal number systems **6M (BL6)**
- OR**
- 2.B. i)** Explain the algorithms in the number system with example. **10M (BL2)**
- ii)** Explain how to convert given hexadecimal number into binary number **4M (BL2)**
- 3.A. i)** List the different types of memories used in computer system. **7M (BL4)**
- ii)** Explain the working of following **7M (BL2)**
- (i) Keyboard (ii) Mouse (iii) I/O (iv) DMA
- OR**
- 3.B. i)** List the peripheral devices using in computer environment **6M (BL4)**
- ii)** Explain the briefly the following memories. **8M (BL2)**
- (i) Cache Memory (ii) EPROM (iii) EEPROM
- 4.A. i)** Explain about control unit **4M (BL2)**
- ii)** Discuss about instruction formats **10M (BL6)**
- OR**
- 4.B. i)** Discuss about ALU. **4M (BL6)**
- ii)** Explain the design of control unit – Micro programmed control and Hard wired control units **10M (BL2)**
- 5.A. i)** List the various applications of the computers and explain **7M (BL4)**
- ii)** Explain about different computer networks. **7M (BL2)**
- OR**
- 5.B. i)** Explain about IoT. **4M (BL2)**
- ii)** Explain briefly IoT applications. **10M (BL2)**

\*\*\*\*\*