PROGRAMME GUIDE

BACHELOR OF ENGINEERING
ELECTRONICS AND COMMUNICATION
(B.E. ECE)

*Scheme of Examination (CBCS/ELECTIVE)
*Detailed Structure of Syllabus

DR. C.V.RAMAN UNIVERSITY
KARGI ROAD, KOTA, BILASPUR, CHATTISGARH(C.G.)
PHONE:07753-253737, Fax: 07753-253728
Website: www.cvru.ac

BACHELOR OF ENGINEERING

Duration: 48 Months (4 Years)

Eligibility: 12th Pass With PCM

COURSE STRUCTURE OF BE- (GROUP B- CSE/EC/EX) SEMESTER I st														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3TBPH101	Basic science course	Engineering Physics	100	50	17	20	07	30	15	2	1	0	3
3TBMA202	Basic science course	Mathematics-I	100	50	17	20	07	30	15	2	1	0	3
3TBME103	Engineering science course	Basic Mechanical Engineering	100	50	17	20	07	30	15	2	1	0	3
3TBCE104	Engineering science course	Basic Civil & Engg Mechanics	100	50	17	20	07	30	15	2	1	0	3
3TBCS105	Humanities course	Communication Skills	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
3TBPH101	Basic science course	Engineering Physics	50	25	12	-	-	25	12	-	-	1	1
3TBME103	Engineering science course	Basic Mechanical Engineering	50	25	12	-	-	25	12	-	-	1	1
3TBCE104	Engineering science course	Basic Civil & Engg Mechanics	50	25	12	-	-	25	12	-	-	1	1
3TBCS105	Humanities course	Communication Skills	50	25	12	-	-	25	12	-	-	1	1
3TBHH106	Mandatory course	Health, Hygiene & Yoga	50	25	12	-	-	25	12	-	-	1	1
3TBRO107	Mandatory course	Rural Outreach	Grades Will Be Awarded										0
Grand Total			750							10	5	5	20

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

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Eligibility: 12th Pass With PCM

COURSE STRUCTURE OF BE- (GROUP B- CSE/EC/EX) SEMESTER II nd														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits	
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution	
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks					
Theory Group														
3TBCH201	Basic science course	Engineering Chemistry	100	50	17	20	07	30	15	2	1	0	3	
3TBMA102	Basic science course	Mathematics-II	100	50	17	20	07	30	15	2	1	0	3	
3TBEG203	Engineering science course	Engineering Graphics	100	50	17	20	07	30	15	2	1	0	3	
3TBEE204	Engineering science course	Basic Electrical Engineering	100	50	17	20	07	30	15	2	1	0	3	
3TBCS205	Engineering science course	Basic Computer Engineering	100	50	17	20	07	30	15	2	1	0	3	
Practical Group				Term End Practical Exam				Sessional						
3TBCH201	Basic science course	Engineering Chemistry	50	25	12	-	-	25	12	-	-	1	1	
3TBEG203	Engineering science course	Engineering Graphics	50	25	12	-	-	25	12	-	-	1	1	
3TBEE204	Engineering science course	Basic Electrical Engineering	50	25	12	-	-	25	12	-	-	1	1	
3TBCS205	Engineering science course	Basic Computer Engineering	50	25	12	-	-	25	12	-	-	1	1	
3TBMP206	Engineering science course	Manufacturing Practices	50	25	12	-	-	25	12	-	-	1	1	
3TBED207	Mandatory course	Entrepreneurship development	Grades Will Be Awarded										0	
Grand Total			**750**							**10**	**5**	**5**	**20**	

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Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

Skill Elective I – Choose any one from the following

STME- 306 (Basic Automobile Maintenance)

STCE- 306 (Water Harvesting & Management)

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COURSE STRUCTURE OF BE- ELECTRONICS & COMMUNICATION ENGINEERING SEMESTER IIIth													
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3TBBE 301	Basic Science	Mathematics-III	100	50	17	20	07	30	15	2	1	0	3
3TBEC 302	Professional Core	Digital Circuits & Systems	100	50	17	20	07	30	15	2	1	0	3
3TBEC 303	Professional Core	Network Analysis	100	50	17	20	07	30	15	2	1	0	3
3TBEC 304	Professional Core	Electronics Devices & Circuits	100	50	17	20	07	30	15	2	1	0	3
3TBEC 305	Professional Core	Measurement & Instrumentation	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBEC 302	Professional Core	Digital Circuits & Systems	50	25	12			25	12	-	-	1	1
3TBEC 303	Professional Core	Network Analysis	50	25	12			25	12	-	-	1	1
3TBEC 304	Professional Core	Electronics Devices & Circuits	50	25	12			25	12	-	-	1	1
3TBEC 306	Professional Core	Software Lab-I	50	25	12			25	12	-	-	1	1
Skill Courses				**Term End Practical Exam**				**Sessional**					
3STEC 307	Skill Enhancement	Skill Elective-I	50	-	-			50	25	-	-	1	1
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent to Grade D

L- Lectures T- Tutorials P- Practical

Major- Term End Theory / Practical Exam

Minor- Pre University Test

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****Skill Elective-I Choose any one from the following**

Hardware/Networking

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COURSE STRUCTURE OF BE- ELECTRONICS & COMMUNICATION ENGINEERING SEMESTER IVth														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3TBBE 401	Basic Science	Energy & Environmental Engineering	100	50	17	20	07	30	15	2	1	0	3
3TBEC 402	Professional Core	Signals & Systems	100	50	17	20	07	30	15	2	1	0	3
3TBEC 403	Professional Core	IC and its Applications	100	50	17	20	07	30	15	2	1	0	3
3TBEC 404	Professional Core	Communication System- I	100	50	17	20	07	30	15	2	1	0	3
3TBEC 405	Professional Core	Control Systems	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBEC 402	Professional Core	Signals & Systems	50	25	12			25	12	-	-	1	1
3TBEC 403	Professional Core	IC and its Applications	50	25	12			25	12	-	-	1	1
3TBEC 404	Professional Core	Communication System- I	50	25	12			25	12	-	-	1	1
3TBEC 406	Professional Core	Software Lab-II	50	25	12			25	12	-	-	1	1
Skill Courses				**Term End Practical Exam**				**Sessional**					
3STEC 407	Skill Enhancement	Skill Elective-II	50	-	-			50	25	-	-	1	1
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

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****Skill Elective-II Choose any one from the following**

STEC 407 Home appliances Repairing or House Wiring

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BACHELOR OF ENGINEERING

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Eligibility: 12th Pass With PCM

COURSE STRUCTURE OF BE- ELECTRONICS & COMMUNICATION ENGINEERING SEMESTER Vth														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits	
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution	
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks					
Theory Group														
3TBEC 501	Professional Core	Solid State Devices	100	50	17	20	07	30	15	2	1	0	3	
3TBEC 502	Professional Core	Communication System- II	100	50	17	20	07	30	15	2	1	0	3	
3TBEC 503	Professional Core	Microprocessor & Microcontrollers	100	50	17	20	07	30	15	2	1	0	3	
3TBEC 504	Professional Core	Communication Network and Transmission Lines	100	50	17	20	07	30	15	2	1	0	3	
3TBEC 505	Professional Core	Electromagnetic Theory	100	50	17	20	07	30	15	2	1	0	3	
Practical Group				**Term End Practical Exam**				**Sessional**						
3TBEC 502	Professional Core	Communication System-II	50	25	12			25	12	-	-	**1**	1	
3TBEC 503	Professional Core	Microprocessor & Microcontrollers	50	25	12			25	12	-	-	1	1	
3TBEC 504	Professional Core	Communication Network and Transmission Lines	50	25	12			25	12	-	-	1	1	
3TBEC 506	Professional Core	Software Lab-III	50	25	12			25	12	-	-	1	1	
		MOOC	GRADES WILL BE AWARDED											
Skill Courses				**Term End Practical Exam**				**Sessional**						
3STEC 507	Skill Enhancement	Skill Elective-III	50	-	-			50	25	-	-	1	1	
Grand Total			**750**							**10**	**5**	**5**	**20**	

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

Skill Elective-III **Linux-Unix or Embedded Systems

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Eligibility: 12th Pass With PCM

COURSE STRUCTURE OF BE- ELECTRONICS & COMMUNICATION ENGINEERING SEMESTER VIth														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits	
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution	
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks					
Theory Group														
3TBEC 601	Professional Core	Industrial Electronics	100	50	17	20	07	30	15	2	1	0	3	
3TBEC 602	Professional Core	Digital Signal Processing	100	50	17	20	07	30	15	2	1	0	3	
3TBEC 603	Professional Core	Antenna and Wave Propagation	100	50	17	20	07	30	15	2	1	0	3	
3TBEC 604	Professional Core	VLSI Circuits & Systems	100	50	17	20	07	30	15	2	1	0	3	
3TBEC 605	Professional Core	Cellular Mobile Communication	100	50	17	20	07	30	15	2	1	0	3	
Practical Group				**Term End Practical Exam**				**Sessional**						
3TBEC 602	Professional Core	Digital Signal Processing	50	25	12			25	12	-	-	1	1	
3TBEC 603	Professional Core	Antenna and Wave Propagation	50	25	12			25	12	-	-	1	1	
3TBEC 604	Professional Core	VLSI Circuits & Systems	50	25	12			25	12	-	-	1	1	
3TBEC 606	Professional Core	Software Lab-IV	50	25	12			25	12	-	-	1	1	
Skill Courses				**Term End Practical Exam**				**Sessional**						
3STEC 607	Skill Enhancement	Skill Elective-IV	50	-	-			50	25	-	-	1	1	
Grand Total			**750**							**10**	**5**	**5**	**20**	

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

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Skill Elective-IV **Python or App Development

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COURSE STRUCTURE OF BE- ELECTRONICS & COMMUNICATION ENGINEERING SEMESTER VIIth													
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3TBEC 701	Professional Core	Professional Elective - I	100	50	17	20	07	30	15	2	1	0	3
3TBEC 702	Professional Core	Optical Communication	100	50	17	20	07	30	15	2	1	0	3
3TBEC 703	Professional Core	Microwave Engineering	100	50	17	20	07	30	15	2	1	0	3
3TBEC 704	Professional Core	Digital Image Processing	100	50	17	20	07	30	15	2	1	0	3
3TBEC 705	Professional Core	Satellite Communication	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
3TBEC 702	Professional Core	Optical Communication	50	25	12			25	12	-	-	1	1
3TBEC 703	Professional Core	Microwave Engineering	50	25	12			25	12	-	-	1	1
3TBEC 704	Professional Core	Digital Image Processing	50	25	12			25	12	-	-	1	1
3TBEC 706	Project Work	Minor Project	50	25	12			25	12	-	-	1	1
3TBEC 707	Industry Internship	Industrial Training/Internship/IPR	50	25	12			25	12	-	-	1	1
Grand Total			750							10	5	5	20

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

** Elective-I 1. **(A) Wireless Communication** **2. (B) Information Theory & Coding** **3. (C) Nano Technology**

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COURSE STRUCTURE OF BE- ELECTRONICS & COMMUNICATION ENGINEERING SEMESTER VIIIth														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3TBEC 801	Professional Core	Professional Elective – II	100	50	17	20	07	30	15	2	1	0	3
3TBEC 802	Professional Core	Computer Networks	100	50	17	20	07	30	15	2	1	0	3
3TBEC 803	Professional Core	TV & RADAR Engineering	100	50	17	20	07	30	15	2	1	0	3
3TBEC 804	Professional Core	Open Elective	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBEC 802	Professional Core	Computer Networks	50	25	12			25	12	-	-	**1**	1
3TBEC 803	Professional Core	TV & RADAR Engineering	50	25	12			25	12	-	-	1	1
3TBEC 805	Project Work	Major Project	150	100	50			50	25	-	-	4	4
3TBEC 806	Seminar	Seminar	100	-	-			100	50	-	-	1	1
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**
Major- Term End Theory / Practical Exam
Minor- Pre University Test
Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

** Elective-II
1. **(A) Adhoc & Sensor Network**
2. **(B) Principle of Biomedical Instrumentation**
3. **(C) Communication Switching Techniques**

**** Open Elective**
(A) Principle of Management & Managerial Economics
(B) Soft Computing
(C) Web Engineering
(B) Industrial Robotics

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SEMESTER- 1st **Subject Code:3TBPH101**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: ENGINEERING PHYSICS **Theory Min. Marks**:17

COURSE OBJECTIVE:

The objective of this course is to equip the students with standard concepts and tools or an intermediate to advanced level.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Quantum mechanics: Wave nature of particles and the Schrodinger equation Introduction to Quantum mechanics, Wave nature of Particles, operators, Time-dependent and time-independent Schrodinger equation for wave function, Application: Particle in a One-dimensional Box, Born interpretation, Free-particle wave function and wave-packets, vg and vp relation Uncertainty principle.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Wave optics: Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.	Classroom teaching ICT tools and Google classroom
Unit – III	Introduction to solids: Free electron theory of metals, Fermi level of Intrinsic and extrinsic, density of states, Bloch's theorem for particles in a periodic potential, Kronig-Penney model (no derivation) and origin of energy bands. V-I characteristics of PN junction, Zener diode, Solar Cell, Hall Effect.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO2), solid-state lasers(ruby, Neodymium),Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine. Introduction to Optical fiber, acceptance angle and cone, Numerical aperture, V number, attenuation.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – V	Fiber Optics: Light guidance through optical fibre, types of fibre, numerical aperture, V-Number, Fibre dispersion (through ray theory in step index fibre), block diagram of fibre optic communication system. Nuclear Physics: Nuclear composition, mass defect, binding energy, nuclear force, liquid drop model, elementary idea about nuclear fission and fusion.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

Experiments as suggested by the course coordinator.

Course Outcome:

- Gain a knowledge and understanding of fundamental physical concepts in the areas covered in this class.
- Apply an understanding of these concepts to various systems and devises.
- Acquire problem solving skills, mathematical techniques, and the ability to synthesize.

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• The ability to formulate, conduct, analyzes and interprets experiments in engineering physics

List of suggestive core experiments: -

1. Biprism, Newton's Rings, Michelsons Interferometer.
2. Resolving Powers –Telescope, Microscope, and Grating.
3. G.M. Counter
4. Spectrometers-R.I., Wavelength, using prism and grating
5. Optical polarization based experiments: Brewster's angle, polar meter etc.
6. Measurements by LASER-Directionality, Numerical aperture, Distance etc.
7. Uses of Potentiometers and Bridges (Electrical)..
8. Experiments connected with diodes and transistor.
9. Measurement of energy band gap of semiconductor.
10. To study Hall effect.
11. Solar cell.
12. To find the width of s single slit by f He-Ne Laser.
13. To determine the numeral aperture (NA) of a Optical Fibre.
14. To determine plank's constant.

Text Books:-

1. Engineering Physics by Navneet Gupta & S.K. Tiwary.
2. A Text Book of Engg Physics – N. Gupta & S.K. Tiwary , Dhanpat Rai & Co. , Delhi

References Books:

1. Engineering Physics- Purnima Swarup Khare, Laxmi Publication
2. Concepts of Modern Physics- Beiser, TMH
3. Solid State Physics by Kittel ,Wiley India
4. Engineering Physics-Fundamentals and Modern Applications – by Purnima Swarup Khare, Infinity Press Publications

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about quantum mechanics and nuclear physics.	Goal04(quality education)	

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SEMESTER- 1st **Subject Code:3TBMA202**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: MATHEMATICS-I **Theory Min. Marks**:17

COURSE OBJECTIVE:

To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions. To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems. To develop the tool of ordinary differential equation for learning advanced Engineering Mathematics. To familiarize the student with functions of several variables that is essential in most branches of engineering. To develop the essential tool of matrices and linear algebra in a comprehensive manner.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables), Method of Lagranges Multipliers.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Definite Integral as a limit .of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration, Applications of multiple integral for calculating area and volumes of the curves.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations	Classroom teaching ICT tools and Google classroom
Unit – IV	Vector Space, Vector Sub Space, Linear Combination of Vectors, Linearly Dependent, Linearly Independent, Basis of a Vector Space, Linear Transformations.	Classroom teaching ICT tools and Google classroom
Unit - V	Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.	Classroom teaching ICT tools and Google classroom

Course Outcome:

This Syllabus has been designed to equip engineering student s with necessary mathematical tool's to handle mathematical problem in their core subjects. Through this syllabus they will learn many thing about calculus specially first order differential equation , Roles ,Lagrange's concept about existence of derivatives in some interval ,Expansion of a function in an infinite series by Maclaurin's and Taylor theorem , partial derivative of functions through which maxima minima of two variable function application of matrices in solving linear simultaneous equations, Eigen value Eigen vector,Calay-Hamilton theorem to find Inverse of a matrix ,and concept of vector space.

Text Books:-

1. Basic Engineering Mathematics I by H.K. Dass and Verma Ram

References Books:

1. Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Person Education, 2002 (Indian Edition).
2. B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007. Potter, Goldberg & Edward, Advanced Engineering Mathematics, Oxford University Press.
3. S.S. Shastry, Engineering Mathematics, PHI Learning.

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4. C.B. Gupta, Engineering Mathematics I & II Mcgraw Hill India, 2015.
5. Engineering Mathematics I by D.C. Agarwal

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about calculus and partial differentiation.	Goal04(quality education)	

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SEMESTER- 1st **Subject Code:3TBME103**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: BASIC MECHANICAL ENGINEERING **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To familiarize with the basic concept of Mechanical Engineering
- To familiarize with the scope of Mechanical Engineering
- To familiarize with the job prospects of Mechanical Engineer.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Materials: Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness , ductility, brittleness , malleability etc. of materials , Tensile test- Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity, Hardness and Impact testing of materials, BHN etc.	Classroom teaching ICT tools and Google classroom
Unit – II	Measurement: Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier calliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination set. Production Engineering: Elementary theoretical aspects of production processes like casting, carpentry,welding etc Introduction to Lathe and Drilling machines and their various operations.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Fluids: Fluid properties pressure, density and viscosity etc. Types of fluids , Newton's law of viscosity , Pascal's law , Bernoulli's equation for incompressible fluids, Only working principle of Hydraulic machines, pumps, turbines, Reciprocating pumps.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Thermodynamics: Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy. Steam Engineering: Classification and working of boilers, mountings and accessories of boilers, Efficiency and performance analysis, natural and artificial draught, steam properties, use of steam tables.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Reciprocating Machines: Working principle of steam Engine, Carnot, Otto, Diesel and Dual cycles P-V & T-S diagrams and its efficiency, working of Two stroke & Four stroke Petrol &Diesel engines. Working principle of compressor.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

At the end of this course students will able to:

- Identify engineering materials, their properties, testing and manufacturing methods encountered in engineering practice.
- Understand Concept of measurement by using measuring instrument Vernier caliper, Micrometer, Dial gauge, Slip gauge etc.
- Understand basics of thermodynamics and components of a thermal power plant
- Understand the construction, operation and performance of different IC engines.
- Understand basics of fluids, their properties and laws of fluid Mechanics.

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List of Experiments

1. To verify law of triangle of forces.
2. To verify the Lami's theorem.
3. To verify the law of polygon of forces.
4. To verify the law of lever.
5. To determine the support reactions of a simply supported beam subjected to point loads.
6. To draw the variation of bending moment at a given section in a simply supported beam under a moving point load.
7. To find the coefficient of friction between surfaces of wooden plane and following blocks:

i) Aluminum ii) Tin iii) Glass iv) Asbestos v) Teak ply vi) Sand paper vii) card board.

8. To determine the coefficient of friction between

(i) Belt and pulley

(ii) Rope and pulley.

9. To study simple jib crane and to determine the internal forces in members of jib crane.
10. To determine the stiffness of helical compression spring.
11. To study lifting machine.
12. To study the lifting machine "second order pulley system" and to draw the following characteristic diagram:

i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram

Also, to determine the law of machine and the maximum efficiency of machine.

13. To study the lifting machine "Wheel and Differential axle" and to draw the following characteristic diagram:

i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram

Also, to determine the law of machine and the maximum efficiency of machine.

14. To study the lifting machine "Worm and worm wheel" and to draw the following characteristic diagram:

i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram

Also, to determine the law of machine and the maximum efficiency of machine.

15. To study the lifting machine "Simple screw jack" and to draw the following characteristic diagrams of the machine:

i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram

Also, to determine the law of machine and the maximum efficiency of machine.

16. To study the lifting machine "Modified screw jack" and to draw the following characteristic diagrams of the machine:

i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram

Also, to determine the law of machine and the maximum efficiency of machine.

17. To study the lifting machine "Geared Jib crane" and to draw the following characteristic diagrams of the machine:

i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram

Also, to determine the law of machine and the maximum efficiency of machine.

18. To study the lifting machine "Single Purchase Winch crab" and to draw the following characteristic diagrams of the machine:

i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram

Also, to determine the law of machine and the maximum efficiency of machine.

19. To study the lifting machine "Double Purchase Winch crab" and to draw the following characteristic diagrams of the machine:

i. Load-effort diagram

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ii. Load- ideal effort diagram iii Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.

References Books:

1- Kothandaraman & Rudramoorthy, Fluid Mechanics & Machinery, New Age .
2- Nakra & Chaudhary , Instrumentation and Measurements, TMH.
3- Nag P.K, Engineering Thermodynamics , TMH .
4- Ganesan , Internal Combustion Engines, TMH .
5- Agrawal C M, Basic Mechanical Engineering, Wiley Publication.
6- Achuthan M , , Engineering Thermodynamics ,PHI.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about characteristics of materials	Goal04(quality education)	

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SEMESTER- 1st **Subject Code:3TBCE104**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: BASIC CIVIL & ENGG MECHANICS **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To introduce to student relevance of civil engineering for various engineering applications.
- To introduce to student various elements of buildings and construction materials.
- To introduce to student various methods of land survey and to make him use surveying equipment
- To make student aware of modern investigation techniques in land survey.
- To introduce to student about the water management and transportation engineering.
- Ability to apply knowledge of mathematics, science, and engineering.
- Solve for the resultants of any force systems.
- Determine equivalent force systems.
- Solve the mechanics problems associated with friction forces.
- Obtain the centroid, first moment and second moment of an area.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Building Materials & Construction Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability	Classroom teaching ICT tools and Google classroom
Unit – II	Surveying & Positioning: Introduction to surveying Instruments – levels, thedolites, plane tables and related devices.Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Mapping & sensing: Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing and its applications.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Engineering Mechanics Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent Co- planner forces, free diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

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

- Describe the role of civil engineer in the development of the society and explain relationship of civil engineering with other branches of engineering and technology.
- Discuss types of buildings and select materials of construction.

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• Explain the elements of water supply such as dam, canal and elements of transportation structures.
• Measure heights, distances and angles on ground using basic surveying instruments and plot them on paper.
• Explain the advantages of advances in civil engineering like remote sensing techniques, GIS and GPS.
• Determine the resultant force and moment for a given system of forces

List of Experiments

1. To verify the law of 'POLYGON FORCES'.
2. To find the moment of inertia of a given 'FLYWHEEL'
3. To find the coefficient of friction using 'INCLINED PLANE'.
4. To find the coefficient of friction using 'FRICTION SLIDE APPARATUS'.
5. find the coefficient of friction between 'ROPE & PULLEY'.
6. To verify the forces in member of 'JIB CRANE'.
7. To determine the velocity ratio, mechanical advantage and percentage efficiency in case of a 'SIMPLE SCREW JACK'.
8. To obtain the velocity ratio, mechanical advantage and efficiency of 'DOUBLE PURCHASE WINCH CRAB'.
9. To verify the law of moment using 'BELL CRANK LEVER'.
10. To find out the bending moment at the 'SECTION OF BEAM'.
11. To determine the velocity ratio, mechanical advantage and percentage efficiency in case of a 'MODIFIED SCREW JACK'.

Text Books:-

1. Text book of Engineering Mechanics By R.K. Bansal
2. Text Book of Engineering Mechanics by R.S. Khurmi

References Books:

1. J.L.Meriam and L.G. Kraige, Engineering Mechanics, 7th Ed, John Wiley & Sons, 2012.
2. Timoshenko and Young, Engineering Mechanics, 3rd Ed, McGraw Hill Publishers, 2006.
3. Gere and Timoshenko, Mechanics of Materials, 2nd Ed, CBS Publishers, 2011.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about building construction and surfaces	Goal04(quality education)	

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SEMESTER- 1st **Subject Code:3TBCS105**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: COMMUNICATION SKILLS **Theory Min. Marks:17**

COURSE OBJECTIVE:

The objective of this course is to learn the second language learners ability and to use the four fundamental language skills-reading writing speaking and listening. It will enable the students to speak english correctly and with confidence.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Grammar – Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations.	Classroom teaching ICT tools and Google classroom
Unit – II	Vocabulary Development – Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargon.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	COMMUNICATION: Introduction, Meaning and significance, Process of Communication, Oral and Written Communication, 7 C's of communication, Barriers to communication and ways to overcome them, Importance of communication foe Technical students, non verbal communication	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	DEVELOPING WRITING SKILLS: Planning, Drafting, and Editing, Precise Writing, Precise, Technical definition and Technical description. Report Writing: Features of writing a good Report, Structure of a Formal Report, Report of trouble, laboratory Report, Progress Report.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	BUSINESS CORRESPONDENCE: Importance of business Letters, Parts and Layout; Application, Contents of good Resume, guidelines for Writing Resume, Calling /Sending quotation, Order, Complaint, E-mail and Tender.	Classroom teaching, ICT Based and individual presentation and Google classroom

Topics for the Laboratory:

1. Basic grammar & vocabulary practice (synonyms, antonyms, analogies, sentence completion, correctly spelt words, idioms, proverbs, common errors.
2. Phonetic symbols, pronunciation
3. Listening skills – including listening comprehension
4. Extempore and JAM (Just a minute session)
5. Role play – I
6. Role play – II
7. Body Language
8. Debate
9. Oral presentation – preparation & delivery using audio – visual aids with stress on body language and voice modulations. (Topic to be selected by the instructor)

Course outcome:

Student will develop knowledge, skills and judgment around human communication that facilitate their ability to work ollaboratively with others. Such skills could include communication competencies such as managing conflict, understanding small group process, active listening, appropriate self disclosure, etc.

References Books:

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1. A. J. Thomson and A.V. Martinet, A Practical English Grammar, Oxford IBH.
2. Pub Sanjay Kumarm Pushp Lata, English for Effective Communication, Oxford.
3. 'Technical Communication : Principles and practice', Meenakshi Raman and Sangeeta Sharma (Oxford)
4. 'Effective Business Communication', Krizan and merrier (Cengage learning)
5. 'Business Correspondence and Report Writing' R.C. Sharma and Krishna Mohan, (Tata Mcgraw Hill)
6. 'Speaking and Writing for Effective Business Communication', Francis Soundararaj (Macmillan)
7. Effective Technical Communication', M Arshaf Rizvi (Tata Mcgraw Hill)

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide speaking and writing skills	Goal04(quality education)	

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SEMESTER- 1st **Subject Code:3TBHH106**
Course: BE ECE **Theory Max. Marks: 25**
SUBJECT: HEALTH, HYGIENE & YOGA **Theory Min. Marks**:12

COURSE OBJECTIVE:

It is very important for the protection of our health and helps to present the spread of communicable diseases personal hygiene has social and aesthetic values. The provision of hygiene information first impacts on knowledge and then practice. Yoga education helps in self discipline and self control, leading to immense amount of awareness concentration and higher level of consciousness. This course can prepare the students physically & mentally for the integration of their physical, mental and spiritual faculties so that the students can become healthier, saner and more integrated members of the society & of the nation.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Important of nourishment, nourishment and health categorization of nutrients in food, body parts involved in digestion of food nutrients, bad eating habits concept of food nourishment in India. Nutrient value of common Indian food preservation adulteration in food items uncommon food items. Digestible and indigestible food items. Supplement healthy food items.	Classroom teaching and ICT tools
Unit – II	Introduction to diseases and spondelitis, level spondelitis, acidity, gas, constipation, skin diseases high blood pressure, low blood pressure heat diseases, cough and cold, obesity, diabetes. Diseases of the eye, mental disorder.	Classroom teaching and ICT tools
Unit – III	Introduction of Patanjali, Role of yoga in personality development role of yoga in physical development of body.	Classroom teaching and ICT tools
Unit – IV	Preneyam, Anlom, Vilom, Bhramni.	Classroom teaching and ICT tools
Unit - V	Rollingm Warning, Toning of whole body, Asanas – Vajrasan, Shashenkasan, Bakrasen, Gomukhasan, Ardhmatsendrasan, Surya Namaskar, Naukasan, Sarvangasan, Dhanurasan, Chakrasan, Makrasan, Vrikshasan, Mendookasan.	Classroom teaching and ICT tools

Course Outcome:

- The student to have good health.
- Student have good mental hygiene.
- Possess emotional stability.
- Integrated moral values.
- Attain higher level of consciousness.

References Books:

1. Kirkwood G, Rampes H, Tuffrey V, Richardson J, Pilkington K. Yoga for anxiety: A systematic review of the research evidence.Br J Sports Med.2005
2. Shapiro D, Cook IA, Davydov DM, Ottaviani C, Leuchter AF, Abrams M. Yoga as a complementary treatment of depression: Effects of traits and moods on treatment outcome.Evid Based Complement Alternat Med.2007
3. Pilkington K, Kirkwood G, Rampes H, Richardson J. Yoga for Depression: The research evidence.J Affect Disord.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to understand the nutrient value of food.		

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SEMESTER- 1st **Subject Code:3TBRO107**
Course: BE ECE
SUBJECT: RURAL OUTREACH

COURSE OBJECTIVE:

The main objective of introducing this course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges. Students are expected to observe, investigate and learn about the following aspects of the rural region:

i. Demographics, Literacy, Geographical parameters of the Village
ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages
iii. Social/ Cultural aspects ranging from popular dance forms, music and customs of the concerned village.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	This course shall be done by the students in a self-study mode. Study methodology shall comprise of combining field visits, case studies, analyzing policy documents from different government departments, discussions with field officers, active NGO's and so on.	Classroom teaching , ICT tools ,Google classroom and field visit
Unit – II	The course will not be listed in the time-table and its activities shall be performed by the student sat any time convenient to them.	Classroom teaching , ICT tools ,Google classroom and field visit
Unit – III	The faculty associated with the course shall evaluate the candidate and grade him.	Classroom teaching , ICT tools ,Google classroom and field visit
Unit – IV	For evaluation purpose, students are expected to submit a hand-written summary on the government schemes and policies for the socio-cultural development of the concerned village. This shall be followed by final submission of two case studies covering broad spectrum of socio-cultural issues ranging from life in slums, infant mortality, watershed management, portability of water, animal welfare etc. These case studies (handwritten) shall be submitted to the mentor for the final evaluation of the coursework.	Classroom teaching , ICT tools ,Google classroom and field visit

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity

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SEMESTER- 2nd | **Subject Code:3TBCH201**
Course: BE ECE | **Theory Max. Marks:50**
SUBJECT: ENGINEERING CHEMISTRY | **Theory Min. Marks**:17

COURSE OBJECTIVE:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Molecular Structure & Bonding: VSEPR Model, Valance-Bond Theory, Molecular Orbital Theory,Molecular Orbital of Polyatomic Molecules Electrochemistry: Arrhenius theory of electrolytic dissociation, Transport Number, Kohlrausch'sLaw, Solubility Product, Redox Reaction, Electrochemical & Concentration Cells.	Classroom teaching , ICT tools and Google classroom
Unit – II	Chemical & Phase Equilibria: Phase Diagram for single component system (Water), Phase diagram forBinary Eutectic System (Copper-Silver), Corrosion of metals in acids, Corrosion by Oxygen, Corrosion by Metal Contact. Reaction Dynamics: Order, Molecularity, Rate Law, Methods of determining order of reaction (1st&2nd Order).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Polymers & Polymerization: Monomers, Polymers, their classification, thermoplastics & thermosetting with examples, Bio-Polymerization, Bio-Degradable Polymerization, Preparation, Properties & Technical Applications of PVC, PVA, Teflon, Nylon6, & Nylon6:6, Polyester, Phenol-Formaldehyde, Urea-Formaldehyde, Natural & Synthetic Rubber, Vulcanization of Rubber.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	(i) Lubricants and Lubrication (4 Lectures) Introduction, Mechanism of lubrication, Classification of lubricants, significance & determination of Viscosity and Viscosity Index, Flash & Fire Points, Cloud & Pour Points, Aniline Point, Acid Number, Saponification Number, Steam Emulsification Number and related numerical problems. (ii) Spectroscopic techniques and application (6 Lectures) Principle, Instrumentation & Applications, electronics spectroscopy, Vibrational & Rotational Spectroscopy of diatomic molecules.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	(i) Water – Analysis, Treatments and Industrial Applications (4 Lectures) Sources, Impurities, Hardness & its units, Determination of hardness by EDTA method, Alkalinity & its determination and related numerical problems. (ii) Boiler problem & softening methods (4 Lectures) Boiler troubles (Sludge & Scale, Priming & Foaming, Boiler Corrosion, Caustic Embrittlement), Softening methods (Lime-Soda, Zeolite and Ion Exchange Methods) and related problems.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

1. To determine the percentage composition of a mixture of Sodium Hydroxide
2. and Sodium Chloride.
3. To determine the amount of Sodium Carbonate in the given mixture of
4. Sodium Carbonate and Sodium Bicarbonate.
5. Determine the amount of Oxalic Acid and Sulphuric Acid/Hydrochloric Acid in one

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6. litre of solution given standard Sodium Hydroxide and Potassium Permanganate.
7. 4. To determine the Carbonate, Bicarbonate and Chloride contents in irrigation water.
8. 5. Argentometric titration one each of Vohlard's method and of Mohr's method.
9. 6. Complexometric Titrations Ca & Mg.
10. 7. Deternimation of dissolved Oxygen in given sample of water.
11. 8. Deterination of calorific value of fuel by Bomb Calorimeter.
12. Determination of Flash Point and Fine Point of lubricant by Abels and Pensky
13. Martin apparatus.

Course Outcome:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.
Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels.

The course will enable the student to:

• Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
• Rationalise bulk properties and processes using thermodynamic considerations. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
• List major chemical reactions that are used in the synthesis of molecules

Text Books:-
1. Engineering Chemistry by S.S. Dara
2. Engineering Chemistry by R. Gopalan & Venkappayya & Nagarajan

References Books:

1. Lee, J. D., Author, Concise Inorganic Chemistry, Oxford University Press Alberty.
2. R.A. Physical Chemistry, John Wiley and Sons.
3. N. Krishnamurthy, P. Vallinayagam, Engineering Chemistry, PHI Learning Pvt. Ltd. Kuriacose J.C. and Rajaram J., Chemistry in Engineering and Technology Tata Msgraw Hill.
4. Polymer Science – Ghosh, Tata McGraw Hill

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about olymers.	Goal04(quality education)	

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SEMESTER- 2nd
Course: BE ECE
SUBJECT: MATHEMATICS-II

Subject Code:3TBMA102
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

Introduced effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes. Introduced Fourier Series & Fourier Transform. Introduced the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems. Acquainted the student with mathematical tools available in vector calculus needed various field of science and engineering.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Ordinary differential Equations: Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties	Classroom teaching , ICT tools and Google classroom
Unit – II	Partial Differential Equations: Formulation of Partial Differential equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients. Method of separation of variable's	Classroom teaching , ICT tools and Google classroom
Unit – III	Fourier series: Fourier Series for Continuous & Discontinuous Functions, Expansion of odd and even periodic functions, Half range Fourier series, Half range sine and cosine series, Parseval's theorem, Fourier transform, Fourier sine and cosine transform	Classroom teaching , ICT tools and Google classroom
Unit – IV	Functions of Complex Variable: Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle)	Classroom teaching , ICT tools and Google classroom
Unit - V	Vector Calculus: Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems.	Classroom teaching , ICT tools and Google classroom

Course Outcome:

Today calculus has become the heart of every engineering stream. Through this syllabus student will learn different techniques of solving different kind of higher order ordinary and partial differential equations. Expansion of periodic function in an infinite series of sine and cosine function through Fourier series, Function of complex variable's based on complex number and also vector calculus based on vectors.

Text Books:-

1. Text Book of Engineering Mathematics 3rd Sem. by N.P. Bali & Manish Goyal

References Books:

1. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press, 2013. E.Kreyszig, Advanced

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Engineering Mathematics, John Wiley & Sons Inc.
2. Micheal Greenberg, Advanced Engineering Mathematics, Second Edition, Person Education, 2002 (Indian Edition).
3. B.V. Rammana, Higher Engineering Mathematics, Tata Msgraw Hill Publishing Company, 2007. Shanti Narayan, A Course of Mathematical Analysis. S.Chand & Co.Delhi.
4.Marwaha, Introduction to Linear Algebra, PHI Learning.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about vector calculus.	Goal04(quality education)	

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SEMESTER- 2nd
Course: BE ECE
SUBJECT: ENGINEERING GRAPHICS

Subject Code:3TBEG203
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To familiarize with the construction of geometrical figures.
- To familiarize with the projection of 1D, 2D and 3D elements .
- To familiarize with the sectioning of solids and development of surfaces.
- To familiarize with the Preparation and interpretation of building drawing .

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;	Classroom teaching , ICT tools and Google classroom
Unit – II	Orthographic Projections covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes – Auxiliary Planes,Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views, Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors and fixtures such as WC, bath, sink, shower, etc.	Classroom teaching , ICT tools and Google classroom
Unit – III	Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)	Classroom teaching , ICT tools and Google classroom
Unit – IV	Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;	Classroom teaching , ICT tools and Google classroom
Unit - V	Overview of Computer Graphics covering, listing the computer technologies that impact ongraphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (ButtonBars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used inCAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids]Customisation & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and to learning; Orthographic constraints, Snap to objects manually and automatically, Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles. Use of solid modelling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling;Introduction to Building Information Modelling (BIM).	Classroom teaching , ICT tools and Google classroom

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List of Experiments:

Drawing for topics covered in the theory as suggested by the course coordinator.

Course outcome:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to creating working drawings
- Ability to draw projections and analysing multiple views of object.

Text Books:-

1. Engineering Drawing by R.K. Dhawan

References Books:

1. N.D. Bhatt and V. M. Panchal, Engineering Drawing Plane and Solid Geometry, Charotar Publishing House.
2. James Leach, AutoCAD 2015 Instructor, SDC Publications.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to get the knowledge of drawing scales and Computer Aided Design	Goal04(quality education)	

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SEMESTER- 2nd
Course: BE ECE
SUBJECT: BASIC ELECTRICAL ENGINEERING

Subject Code:3TBEE204
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

1. To provide knowledge of basic concepts related to electrical engineering.
2. To provide knowledge of basic Circuits: 1- phase AC Circuits, 3-phase AC Circuits, Magnetic Circuits, Electrical Machines

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	D.C. Circuits: Units and dimensions, Ohm's Law, Kirchhoff's Law, Superposition theorem, Thevenin's theorem and their application for analysis of series and parallel resistive circuits excited by independent voltage sources, Power & Energy in such circuits. Mesh & nodal analysis, Star Delta circuits.	Classroom teaching , ICT tools and Google classroom
Unit – II	1- phase AC Circuits: Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity , Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series & parallel circuit.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	3-phase AC Circuits: Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections. Power in balanced & unbalanced three-phase system and their measurements	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Magnetic Circuits: Basic definitions, magnetization characteristics of Ferro magnetic materials, self inductance and mutual inductance, energy in linear magnetic systems, coils connected in series, AC excitation in magnetic circuits, magnetic field produced by current carrying conductor, Force on a current carrying conductor. Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F. Single phase transformer- general construction, working principle, e.m.f. equation, open circuit and short circuit test	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Electrical Machines: D.C. Motor & D.C. Generator, Three phase Induction motor and SynchronousMachines, their general construction, working principle, emf equation and applications. Types of losses occurring in electrical machines	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

After successful completion of course,

- Students are expected to possess an in-depth understanding and Knowledge of 1- phase AC Circuits, 3-phase AC Circuits, Magnetic Circuits, Electrical Machines
- Develop the concepts of basic electrical engineering for all the undergraduate students of different branches of engineering.

List of Experiments:

- Verifications of Thevenin's Superposition theorem.
- Study of Transformer, name plate rating, determination of rayio and polarity.
- Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
- Separation of resistance and inductance of choke coil.

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• Measurement of various line & phase quantities for a 3-phase circuit.
• Identification of different Electronics components.
• Observing input and output waveforms of rectifiers.
• Transistor application as amplifier and switch.
• Verification of truth table for various gates.

Text Books:-

1. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.

References Books:

1. Basic Electrical Engineering by S.K. Sahdev & R.K.Chaturvedi
2. S.N. Singh , Basic Electrical Engineering, P.H.I.,2013 .
3. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall, 2014.
4. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press,2012.
5. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
6. Bharti Dwivedi, Fundamentals of Electrical Engineering, Wilkey India,2013.
7. Sanjeev Sharma, Basic Electrical Engineering, I.K. International.
8. Basic Electrical Engineering by V N Mittle & Arvind Mittal

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Identification of several machines. Achieving the knowledge of speed control of dc motors .	Goal04(quality education) Goal09(Industry, Innovation & Infrastructure)	

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SEMESTER- 2nd **Subject Code:3TBCS205**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: BASIC COMPUTER ENGINEERING **Theory Min. Marks**:17

COURSE OBJECTIVE:

By the end of this course, the student will be able to:-

1. Analysing problems, and designing and implementing algorithmic solutions.
2. Solving problems properly, achieving an implementation that is correct, effective and efficient.
3. Using computers at user level, including operative systems and programming environments.
4. Knowledge of computer equipment, including both hardware and software.
5. Identifying information needs to solve problems, recovering information and applying it to the resolution.
6. Opportunity to learn key concepts of computer, as well as fundamentals and applications of computer.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Computer: Definition, Classification, Organization i.e. CPU, register, Bus architecture, Instruction set, Memory & Storage Systems, I/O Devices, and System & Application Software. Computer Application in e-Business, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc. Operating System: Definition, Function, Types, Management of File, Process & Memory. Introdcution to MS word, MS powerpoint, MS Excel	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Introduction to Algorithms, Complexities and Flowchart, Introduction to Programming, Categories of Programming Languages, Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS object oriented Programming.Introduction to C++: Character Set, Tokens, Precedence and Associatively, Program Structure, Data Types, Variables, Operators, Expressions, Statements and control structures, I/O operations, Array, Functions	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual functions. Introduction to Data Structures.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Computer Networking: Introduction, Goals, ISO-OSI Model, Functions of Different Layers. Internetworking Concepts, Devices, TCP/IP Model. Introduction to Internet, World Wide Web, Ecommerce Computer Security Basics: Introduction to viruses, worms, malware, Trojans, Spyware and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Cyber Pornography, Email spoofing, Denial of Service (DoS), Cyber Stalking, ,Logic bombs, Hacking Spamming, Cyber Defamation , pharming Security measures Firewall, Computer Ethics & Good Practices, Introduction of Cyber Laws about Internet Fraud, Good Computer Security Habits.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Data base Management System: Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data independence, Data dictionary, DBA, Primary Key, Data definition language and Manipulation Languages. Cloud computing: definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of	Classroom teaching, ICT Based and individual presentation and Google classroom

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	cloud (public, private, community and hybrid clouds), Pros and Cons of cloud computing	

List of Experiment

1. Study and practice of Internal & External DOS commands.
2. WAP to illustrate Arithmetic expressions
3. WAP to illustrate Arrays
4. WAP to illustrate functions.
5. Write program to illustrate Conditional Statements
6. Write program to illustrate Loop Statements..
7. WAP to illustrate constructor & Destructor
8. WAP to illustrate Object and classes
9. WAP to illustrate Operator overloading
10. WAP to illustrate Function overloading
11. WAP to illustrate Derived classes & Inheritance
12. WAP to insert and Delete end Element from the stack
13. WAP to insert and delete end element from the Queue

Course outcome:

By the end of this course, the student will

- Analysing problems, and designing and implementing algorithmic solutions.
- Solving problems properly, achieving an implementation that is correct, effective and efficient.
- Using computers at user level, including operative systems and programming environments.
- Knowledge of computer equipment, including both hardware and software.
- Identifying information needs to solve problems, recovering information and applying it to the resolution.
- Opportunity to learn key concepts of computer, as well as fundamentals and applications of computer.

References Books:

1. Fundamentals of Computers : E Balagurusamy, TMH
2. Introduction of Computers : Peter Norton, TMH
3. Kerninghan & Ritchie "The C programming language", PHI
4. Kanetkar Y. "Let us C", BPB.
5. Microsoft_Office_2007_Illusrated_Windows_XP_Edition_Introductory by David W. Beskeen, Jennifer Duffy.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Network Engineer	Able to understand the knowledge of computer peripheral	Goal04(quality education) Goal09(Industry, Innovation & Infrastructure)	

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SEMESTER- 2nd **Subject Code:3TBMP206**
Course: BE ECE **Theory Max. Marks:25**
SUBJECT: MANUFACTURING PRACTICES **Theory Min. Marks**:12

COURSE OBJECTIVE:

- To familiarize with the basics of tool sand equipments used in fitting, carpentry, sheetmetal, welding and smithy
- To familiarize with the production of simple models in the above trades.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	FITTING: Tools&Equipments–Practiceinfiling.MakingVeeJoints,Square,Dovetailjoints and Keymaking-plumbing. SuggestedMiniproject–Assembly of simple I.C.engines	Classroom teaching , ICT tools and Google classroom
Unit – II	CARPENTRY: Tools and Equipments- Planning practice. Making Half Lap, Dovetail, Mortise & Tenon joints. Suggested Mini project-model of a single door window frame.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	SHEETMETAL: Toolsandequipments–practice.Makingrectangulartray,hopper,scoop,etc. Suggested Mini project-Fabrication of a small cabinet, dust bin, etc.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Tools and equipments– Arcweldingofbuttjoint,Lapjoint,Teefillet.Demonstrationofgaswelding, TIG & MIG welding.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	SMITHY: Tools and Equipments– Making simple parts like hexagonal headed bolt, chisel. FOUNDRY: Tools and Equipments, Mould making, conducting casting operation of a job.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

- On completion of this course, students will be able to
- Make half lap joint and dovetail joint in carpentry.
- Make welded lap joint, butt joint and T-joint.
- Prepare sand mould for cube, conical bush, pipes and V pulley.
- Fabricate parts like tray, frustum of cone and square box in sheet metal.

References Books:

1. S. Hazara Choudhary, Gopal. T.V. Kumar T and Murali G. "A first course on workshop practice – theory, practice and work book", Suma Publications, Chennai, 2005.
2. Kannaiah. P and Narayanan. K.C. "Manual on workshop practice", Scitech Publications.
3. Venkatachalpathy. V.S. "First year Engineering Workshop Practice", Ramalinga Publications.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to get the knowledge about tools, equipment and foundry	Goal04(quality education) Goal09(Industry, Innovation & Infrastructure)	

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SEMESTER- 2nd **Subject Code:3TBED207**

Course: BE ECE

SUBJECT: ENTREPRENEURSHIP DEVELOPMENT

COURSE OBJECTIVE:

Understanding basic concepts of entrepreneurship and key steps in the elaboration of business ideas, Developing personal creativity and entrepreneurial initiative.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Entrepreneurship-Definition, Characteristics and importance, Types and functions of an entrepreneur, merits of a good entrepreneur motivational factors of entrepreneurship.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Motivation to achieve targets and establishment of ideas. Setting targets and facing challenges. Resolving problems and creativity. Sequenced planning and guiding capacity, Development of self confidence. Communication skills, Capacity to influence, leadership.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Project Report- Evaluation of selected process. Detailed project report - Preparation of main part of project report pointing out necessary and viability.Selecting the form of Organization: Meaning and characteristics of sole Proprietorship, Partnership and cooperative committees, elements affecting selection of a form of an organization.Economic management -Role of banks and financial institutions banking, financial plans, working capital-evaluation and management, Cost and Price determination, Calculation of Profits, keeping of accounts.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Production management - Methods of purchase. Management of movable assets/goods. Quality management. Employee management. Packing. Marketing management Sales and the art of selling. Understanding the market and market policy. Consumer management. Time management.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Role of regulatory institutions - district industry centre, pollution control board, food and drug administration, special study of electricity development and municipal corporation. Role of development organizations, khadi & village Commission/ Board, State Finance Corporation, scheduled banks, MP Women's Economics Development Corporation. Self-employment-oriented schemes, Prime Minister's Employment schemes, Golden Jubilee Urban environment scheme, Rani Durgavati Self-Employment scheme, Pt. Deendayal Self-employment scheme.Various grant schemes - Cost-of-Capital grant, interest grant, exemption from entry tax, project report, reimbursement grant, etc. Special incentives for women entrepreneurs, prospects 8s possibilities. Schemes of Tribal Finance Development Corporation, schemes of Antyavasai Corporation, schemes of Backward Class and Minorities Finance Development Corporation.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course Outcome:

Understanding basic concepts in the area of entrepreneurship, understanding the stages of the entrepreneurial process, adopting of the key steps in the elaboration of business ideas, Developing personal creativity and entrepreneurial initiative.

Reference Books:

1. Fundamental of Entrepreneurship : Sangram Kesari Mohanty (PHI Publications)
2. Udhyamita Vikas : U.C. Gupta (Kailash Prakashan)

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3. Entrepreneurship Dvenelopment : D. Acharya (Himalya Publication House)

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Supervisor	Able to understand the concept of motivation	Goal04(quality education)	Social enterpreneur

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SEMESTER- 3rd **Subject Code:3TBBE301**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: MATHEMATICS-III **Theory Min. Marks**:17

COURSE OBJECTIVE:

The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems appearing in different sections of science and engineering. More precisely, the objectives are:

- To introduce effective mathematical tools for the Numerical Solutions algebraic and transcendental equations.
- To enable young technocrats to acquire mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation which are used in various branches of engineering?
- To acquaint the student with mathematical tools available in Statistics needed in various field of science and engineering.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Numerical Methods – 1: Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.	Classroom teaching ICT tools and Google classroom
Unit – II	Numerical Methods – 2: Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, GaussSeidal, and Relaxation method.	Classroom teaching ICT tools and Google classroom
Unit – III	Numerical Methods – 3: Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.	Classroom teaching ICT tools and Google classroom
Unit – IV	Transform Calculus: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method.	Classroom teaching ICT tools and Google classroom
Unit - V	Concept of Probability: Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.	Classroom teaching ICT tools and Google classroom

Course Outcomes:

- Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration. Ability to analyze the forces in any structures.
- Ability to solve rigid body subjected to dynamic forces.

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OF SCIENCE AND TECHNOLOGY

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Dist. Bilaspur(C.G.)

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Dr. C.V. Raman University
Kota, Bilaspur (C.G.)

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics ,Khanna Publication.
2. Ramana: Advance Engg. Mathematics, TMH New Delhi
3. Numerical Methods for Engineers by Steven C. Chapra, McGraw Hill Education
4. Introductory Methods of Numerical Analysis by S. S. Sastry, PHI Learning Pvt. Ltd.
5. Numerical Methods ByShrimanta Pal, Oxfor

Reference Books:

1. Erwin Kreyszig: Advanced Engineering Mathematics, Wiley India.
2. Engineering Mathematics By Samnta Pal and Bhutia, Oxford Publication

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide formulate fundamental probability distribution and random variables.	Goal04(quality education)	

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SEMESTER- 3rd
Course: BE ECE
SUBJECT: Digital Circuits & Systems

Subject Code:3TBEC302
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To introduce number systems and codes •
- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- To introduce the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concept of memories, programmable logic devices and digital ICs.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Number Systems: Decimal, Binary, Octal and Hexadecimal systems, conversion from one base to another, Codes-BCD, Excess- 3, Gray Reflected ASCII, EBCDIC. Logic gates and binary operations- AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive– NOR Implementations of Logic Functions using gates, NAND–NOR implementations – Multi level gate implementations- Multi output gate implementations. Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality, Boolean function, Canonical and standard forms, Minimization of Boolean functions, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS),Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method of minimization.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Combinational logic circuits :Half adder – Full Adder – Half subtractor – Full subtractor– Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder– Serial. Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/De-multiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Registers and Counters: Asynchronous Ripple or serial counter. Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Downcounters – Programmable counters – Design of Synchronous counters: state diagram-State table –State minimization –State assignment - Excitation table and maps-Circuit. Implementation - Modulo–n counter, Registers – shift registers - Universal shift registers. Shift register counters – Ring counter – Shift counters - Sequence generators.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Conceptof Programmable logic devices like FPGA. Logic implementation using Programmable Devices.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

- Study of different basic digital logic gates and verification of their Truth Table.
- Study and verification of the law of Boolean Algebra and De-Morgan's Theorem.
- Construction and verification of various combinational circuits such as Half Adder, Full
- Adder, Half & Full Subtractor.
- Study of Multiplexer, De-multiplexer.
- Study of Different Code Converters, Encoder, Decoder.

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• Construction and verification of various types of Flip-Flops using gates and IC's.
• Construction and Verification of different Shift Registers.
• Construction and verification of different types of Counters.
• Study of important TTL technologies, Verifications of important TTL Circuit Parameters.

Course outcome:

On completion of this course, the students can design combinational and sequential digital logic circuits. Also they will have knowledge on Programmable Logic devices and its usage.

Text Books:

• Digital Design, 3rd Edition M. Morris Mano Prentice Hall of India Pvt. Ltd., 2003 Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003
• Digital Principles and Applications 6th Edition Donald P. Leach and Albert Paul Malvino, TMH, 2003.

Reference Books:

• Digital electronics Principles and Integrated circuits Anil K. Maini, Wiley India Pvt. Ltd.
• Fundamental of digital circuit 3rd edition. Anand kumar PHI
• Digital Design, Principles and Practices John. F. Wakerly, Pearson Prentice Hall

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Fabrication Enginer in Chip designing industries	Gain knowledge to interpret the operation of logic circuit such as adders, subtractors, multiplexers, flip-flops, shift registers and counters, able to design asynchronous and synchronous sequential circuits .	Goal04(quality education)	

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SEMESTER- 3rd
Course: BE ECE
SUBJECT: Network Analysis

Subject Code:3TBEC303
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To make the students capable of analyzing any given electrical network.
- To make the students learn how to synthesize an electrical network from a given impedance/admittance function.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to circuit theory: basic circuit element R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources, controlled & uncontrolled sources KCL and KVL analysis, Steady state sinusoidal analysis using phasors; Concept of phasor & vector, impedance & admittance, Nodal & mesh analysis, analysis of magnetically coupled circuits. Dot convention, coupling coefficient, tuned circuits, Series & parallel resonance.	Classroom teaching ICT tools and Google classroom
Unit – II	Network Graph theory: Concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Network Theorems: Thevenins & Norton's, Super positions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Transient analysis: Transients in RL, RC&RLC Circuits, initial& final conditions, time constants. Steady state analysis Laplace transform: solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Two port parameters: Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Reciprocity and Symmetry in all parameter.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

- To Verify Thevenin Theorem and Superposition Theorem.
- To Verify Reciprocity Theorem and Millman's Theorem.
- To Verify Maximum Power Transfer Theorem.
- To Determine Open Circuit and Short Circuit parameters of a Two Port Network.
- To Determine A,B, C, D parameters of a Two Port Network.
- To determine h parameters of a Two Port Network.
- To Find Frequency Response of RLC Series Circuit RLC parallel Circuit and determine resonance and 3dB frequencies. To determine charging and discharging times of Capacitors.

Course outcome:

Analyze simple DC circuits.
- Find Thevenin's and Norton equivalents of circuits.
- Analyze AC steady-state responses and transient response of resistance, inductance and capacitance in terms of impedance. Analyze two port networks.

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Text Books:

- Network Analysis M.E. Van Valkenburg, Pearson
- Network Analysis & Synth S P Ghosh A K Chakraborty MGH

Reference Books:

- Circuit Network Analysis & Synth Sudhakar TMH
- Introductory Circuit analysis Robert L Boylestad Pearson

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Evaluate two-port parameters of a given network.	Goal04(quality education)	

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SEMESTER- 3rd **Subject Code:3TBEC304**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Electronics Devices & Circuits **Theory Min. Marks**:17

COURSE OBJECTIVE:

The main objective of this curriculum/course is to make the students well versed with basic electronic components and circuits. The students can

- Understand the nature and scope of modern electronics.
- Describe physical models of basic components.
- Design and construct simple electronic circuits to accomplish a specific function, e.g., designing amplifiers, ADC converters etc.
- Understand their capabilities and limitations and make decisions regarding their best utilization in a specific situation.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Semiconductor Material Properties: Elemental & compound semiconductor materials Bonding forces and Energy bands in intrinsic and extrinsic silicon, Charge carrier in semiconductors , carrier concentration, Junction properties, Equilibrium condition, biased junction, Steady state condition, breakdown mechanism (Rectifying Diodes, Zener Diodes), Metal Semiconductor Junction. Special diodes: Tunnel diodes, Varactor diodes, Schottky diode, Photo diodes, Photo detector, LED, solar cell.	Classroom teaching ICT tools and Google classroom
Unit – II	Diode circuits: Ideal and Practical diode, Clipper, Clamper. Power Supply: Rectifiers-Half wave, Full wave, Bridge rectifier, filter circuits, Voltage regulation using shunt & series regulator circuits, Voltage regulation using IC.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Fundamentals of BJT: Construction, basic operation, current components and equations, CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region. BJT as an amplifier. Ebers-Moll model, Power dissipation in transistor (Pd, max rating), Photo transistor. Transistor biasing circuits and analysis: Introduction, various biasing methods: Fixed bias, Self bias, Voltage Divider bias, Collector to base bias, Load-line analysis: DC and AC analysis, Operating Point and Bias Stabilization and Thermal Runaway. Transistor as a switch.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Small Signal analysis: Small signal Amplifier, Amplifier Bandwidth, Hybrid model, analysis of transistor amplifier using h-parameter, Multistage Amplifier: Cascading amplifier, Boot-strapping Technique, Darlington amplifier and cas-code amplifier, Coupling methods in multistage amplifier, Low and high frequency response, Hybrid πmodel, Current Mirror circuits. Large Signal analysis and Power Amplifiers: Class A, Class B, Class AB, Class C, Class D, Transformer coupled and Push-Pull amplifier.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	FET construction- JFET: Construction, n-channel and p-channel, transfer and drain characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics. Unijunction Transistor (UJT) and Thyristors: UJT: Principle of operation, characteristics, UJT relaxation oscillator.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

1. To determine and analyze the V-I characteristics of PN Junction diode and Zener diode.
2. To determine input and output characteristics of transistor amplifiers in CE, CB &CC configurations.
3. To determine the frequency response of transistor CE amplifier, direct coupled and RC coupled amplifier.
4. To determine characteristics of UJT as relaxation Oscillator.

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5. To determine Drain and Transfer Characteristics of JFET Amplifier.
6. To determine Drain and Transfer Characteristics of MOSFET Amplifier.
7. To determine characteristics of class A and B power amplifiers.
8.To determine characteristics of class C and AB power amplifiers.

Course outcome:

The combination of lecture and laboratory sessions provides learning opportunities that should enable the student to do the following upon completion of this course:

- Set up a bias point in a transistor.
- Verify the working of diodes, transistors and their applications.
- Build a common emitter/base/collector amplifier and measure its voltage gain.
- Explore the operation and advantages of operational amplifiers.
- Learn to design different types of filters and apply the same to amplifiers.

Text Books:

- Integrated electronics Millman and Halkias TMH
- Electronic Devices and Circuit Theory Boylestad and Nashelsky Pearson Education

Reference Books:

- Microelectronics Sedra and Smith Oxford Press
- Electronic Circuits Analysis and Design Salivahanan TMH
- Electronic Devices and Circuits David A. Bell Oxford University press

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Understand the concepts of Transistor.	Goal04(quality education)	

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SEMESTER- 3rd **Subject Code:3TBEC305**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Measurements & Instrumentation **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To introduce students to monitor, analyze and control any physical system
- To understand students how different types of meters work and their construction
- To provide a student a knowledge to design and create novel products and solutions for real life problems.
- To introduce students a knowledge to use modern tools necessary for electrical projects.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Theory of Measurement: Introduction, Characteristics of Instruments and measurement systems (Static &Dynamic) Error analysis: Sources, types and statistical analysis. Instrument Calibration: Comparison Method. DC and AC Ammeter, DC Voltmeter- Chopper type and solidstate, AC voltmeter using Rectifier. Average, RMS, Peak responding voltmeters, Multi-meter, Power meter, Bolometer and Calorimeter.	Classroom teaching ICT tools and Google classroom
Unit – II	CRO: Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration. Screen for CRTs, Graticules, Vertical and Horizontal deflection system, Time base circuit, Oscilloscope Probes, Applications of CRO, Special purpose CROs- Multi input, Dual trace, Dual beam, Sampling, Storage (Analog and Digital) Oscilloscope Bridges :Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge (High voltage and Relative permittivity), Wein bridge. Impedance measurement by Qmeter	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	(Transducer): Classification of Transducers, Strain gauge, Displacement Transducer Linear Variable Differential Transformer (LVDT) and Rotary Variable Differential Transformer (RVDT), Temperature Transducer-Resistance Temperature Detector (RTD), Thermistor, Thermocouple, Piezo-electric transducer, Optical Transducer- Photo emissive, Photo conductive, Photo voltaic, Photo-diode, Photo Transistor.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Signal and Function Generators, Sweep Frequency Generator, Pulse and Square Wave Generator, Beat Frequency Oscillator, Digital display system and indicators, Classification of Displays, Display devices: Light Emitting diodes (LED) and Liquid Crystal Display(LCD).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Advantages of Digital Instrument over Analog Instrument, Digital-to-analog conversion (DAC) - Variable resistive type, R-2R ladder Type, Binary ladder, Weighted converter using Op-amp and transistor, Practical DAC. Analog-to digital Conversion (ADC) - Ramp Technique, Dual Slope Integrating Type, Integrating Type (voltage to frequency), Successive Approximations. Digital voltmeters and multi-meters, Resolution and sensitivity of digital multi-meter.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

- Study of Cathode Ray Oscilloscope.
- Study of displacement measurement by LVDT.
- Force measurement by strain gauge.
- Measurement of Capacitor using Q-meter.
- Measurement of Self-induction using Q-meter.
- Temperature measurement by thermistor.

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- Study of optical Transducers: Photo-diode, Photo-Transistor.
- Design of digital to analog converter, R-2R ladder Type and analysis of its characteristics.
- To measurement of the unknown Inductance by using Maxwell's bridge method.
- To measurement of the unknown capacitance by using Schering bridge method.
- To measurement of the unknown Frequency by using Wein's bridge method.
- To measurement of the unknown Inductance by using Hay's bridge method.
- To calculate Frequency and amplitude using CRO & Function Generator.
- To calculate Frequency using Lissajious Pattern.
- To study RVDT.
- Study of Function Generator.
- Temperature measurement by thermocouple.
- Temperature measurement by RTD.
- Study of optical Transducers: Photo conductive, Photo voltaic.
- To study digital Multimeter.

Course outcome:

The expected outcomes of the Course/Subject are:
- To use the techniques and skills for electrical projects.
- Design a system, component or process to meet desired needs in electrical engineering.
- Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy.
- Ability to balance Bridges to find unknown values.
- Ability to measure frequency, phase with Oscilloscope.
- Ability to use Digital voltmeters.
- Ability to measure strain, displacement, Velocity, Angular Velocity, temperature, Pressure Vacuum, and Flow.

Text Books:

- Electronics Instrumentation H.S. Kalsi TMH
- Instrumentation and Measurements A.K. Sawhney Dhanpat Rai and Co

Reference Books

- Electronicsand Instrumentation technology Anand PHI
- Electronic Instrumentation and Measurement Bell oxford press

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to acquire knowledge and overview of Transducers.	Goal04(quality education)	

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SEMESTER- 3rd
Course: BE ECE
SUBJECT: Software Lab-I

Subject Code:3TBEC306
Theory Max. Marks:25
Theory Min. Marks:12

Circuit Simulation/ PCB Designing Software

Study of circuit simulation software (any one- TINA-PRO/ PSPICE/ CIRCUIT MAKER/ GPSIM/ SAPWIN etc).

Overview and Study of the key features and applications of the software. Application of the software in the field of Electronic Devices, Electronic Instrumentation and Network Analysis.

Design, Optimization and simulation of

1. Basic Electronic circuits (examples rectifiers, clippers, clampers, diode, transistor characteristics etc).

2. Transient and steady state analysis of RL/ RC/ RLC circuits, realization of network theorems. Use of virtual instruments built in the software.

Study of PCB layout software

Overview and use of the software in optimization, designing and fabrication of PCB pertaining to above circuits simulated using above simulation software or other available. Students should simulate and design the PCB for at least two circuits they are learning in the current semester.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to know the concept of elements in virtual instruments built in software	Goal04(quality education)	

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SEMESTER- 3rd **Subject Code:3STEC307**

Course: BE ECE

SUBJECT: hardware networking

COURSE OBJECTIVE:

Mathematics fundamental necessary to formulate, solve and analyze engineering problems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction of Computer, System Components and peripherals Microprocessor, Memory, Motherboard, SMPS, Hard Disk Drive, Optical Disk Drive, Keyboard and Mouse Monitors, Assembling and disassembling a PC ,I/O Ports and Devices, Working with BIOS/CMOS, Working with Portable PC, Working with Printer Scanners, Preventive Maintenance and Material Recycling, Hardware Troubleshooting, Server Hardware.	Classroom teaching ICT tools and Google classroom
Unit – II	Basics of Electronics, Laptop Basic Hardware, Laptop Disassembly and Reassembly, Troubleshooting, Soldering Techniques, Laptop Motherboard repairing.	Classroom teaching ICT tools and Google classroom
Unit – III	Introduction to Computer Networks, Topology, Transmission Media, Ethernet and other Network Architecture Network protocols, IP addressing ,OSI Model, Internetworking Devices, Installing a wired and wireless Network, Internet connection and sharing, Trouble shooting Network problems.	Classroom teaching ICT tools and Google classroom
Unit – IV	Network security overview, Network perimeter security ,The art of intrusion detection, Network security protocols, Implementing DNS and web security, Implementing e-mail security, Implementing a secure enterprise network, Cryptography basics, methods and standards, Security policies and procedures, Security management.	Classroom teaching ICT tools and Google classroom

List of Experiments:

- System assembling of (Pentium, P-II,P-III,P-IV, Branded-PC, Laptop).
- Windows Installation Operating (98,XP,Vista,Windows 7 ,Windows 8)
- Driver Installation
- Multimedia Installation
- Mother Board Repairing (Card and Chip Level)
- Installation of LAN CARD
- Configure and installation of WIN 2003 SERVER
- Configure window server Computer as a domain controller
- Printer installation and Maintenance
- Keyboard and mouse repairing
- CD-ROM, CD-RW, DVD repairing.
- SMPS repairing (AT/ATX)
- UPS repairing
- Data sharing, Printer sharing, and Internet sharing.
- Configure of DHCP Server and client.

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Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Hardware Engineer	Able to get the knowledge of computer hardware systems	Goal04(quality education)	Service Centre for Computer Hardware

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SEMESTER- 4th **Subject Code:3TBBE401**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Energy and Environmental Engineering **Theory Min. Marks**:17

COURSE OBJECTIVE:

The objective of this Course is to provide an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternative energy sources and their technology and application.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Energy Science: Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment; Overview of energy systems, sources, transformations, efficiency, and storage; Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries).	Classroom teaching ICT tools and Google classroom
Unit – II	Ecosystems Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	Classroom teaching ICT tools and Google classroom
Unit – III	Biodiversity and its conservation Introduction – Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega diversity nation; Hot-sports of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	Classroom teaching ICT tools and Google classroom
Unit – IV	Environmental Pollution Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards; Solid waste Management: Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Pollution case studies; Disaster management: floods, earthquake, cyclone and landslides.	Classroom teaching ICT tools and Google classroom
Unit - V	Social Issues and the Environment From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns. Case Studies Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wild life	Classroom teaching ICT tools and Google classroom

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	Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness.	
Unit - VI	Field work • Visit to a local area to document environmental assets river/ forest/grassland/hill/mountain • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural • Study of common plants, insects, birds. • Study of simple ecosystems-pond, river, hill slopes, etc	

Course outcome:

After completion of this course student will able to recognize different energy sources including renewable and non renewable sources of energy. Different types of pollutions in environment there causes and precautions.

Reference Books

- Essentials of Ecology and Environment Rana SVS PHI Pub
- Environmental management Bala Krishnamoorthy PHI
- Environmental Engineering Gerard Kiely TMH

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to get the knowledge about ecosystem	Goal04(quality education)	

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DR. C.V. RAMAN INSTITUTE OF SCIENCE AND TECHNOLOGY

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Kargi Road,Kota
Dist. Bilaspur(C.G.)

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 4th **Subject Code:3TBEC402**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Signals & Systems **Theory Min. Marks**:17

COURSE OBJECTIVE:

The focus of this course is to introduce you to the fundamental concepts and tools used in both analogue and digital signal processing (ASP and DSP) which are areas of interest if you are studying any program relating to electronic, communication and/or computer engineering.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction of Signals and Systems: Definition of signal, Classification of Signal and representation: Continuous time and discrete time, even/odd, periodic/aperiodic, random/deterministic, energy/power, one/multidimensional, some standard signals, , Basic Operations on Signals for CT/DT signal, transformation of independent & dependent variables, Definition of system and their classification: CT/DT, linear/non-linear, variant/non-variant, causal and non-causal system state/dynamic system, interconnection of systems. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability.	Classroom teaching ICT tools and Google classroom
Unit – II	Linear Time- Invariant Systems: Introduction, Impulse Response Representation for LTI Systems, Convolution, Properties of the Impulse Response Representation for LTI Systems, Difference Equation for LTI Systems, Block Diagram Representations(direct form-I, direct form- II, Transpose, cascade and parallel). Impulse response of DT-LTI system and its properties.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	z-Transform: Introduction, ROC of finite duration sequence, ROC of infinite duration sequence, Relation between Discrete time Fourier Transform and z-transform, properties of the ROC, Properties of z-transform, Inverse z-Transform, Analysis of discrete time LTI system using zTransform, Unilateral z-Transform.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Fourier analysis of discrete time signals: Introduction, Properties and application of discrete time Fourier series, Representation of Aperiodic signals, Fourier transform and its properties, Convergence of discrete time Fourier transform, Fourier Transform for periodic signals, Applications of DTFT.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role. The Sampling Theorem and its implications-Spectra of sampled signals. Reconstruction:	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

- Introduction to MATLAB Tool.
- To implement delta function, unit step function, ramp function and parabolic function for continuous-time.
- To implement delta function, unit step function, ramp function and parabolic function for discrete-time.
- To implement rectangular function, triangular function, sinc function and signum function for continuous-time.
- To implement rectangular function, triangular function, sinc function and signum function for discrete-time.
- To explore the communication of even and odd symmetries in a signal with algebraic operations.
- To explore the effect of transformation of signal parameters (amplitude-scaling, times calling & shifting).
- To explore the time variance and time invariance property of a given system.

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• To explore causality and non-causality property of a system.
• To demonstrate the convolution of two continuous-time signals.
• To demonstrate the correlation of two continuous-time signals.
• To demonstrate the convolution of two discrete-time signals.
• To demonstrate the correlation of two discrete-time signals.
• To determine Magnitude and Phase response of Fourier Transform of given signals.

Course outcome:

As an outcome of completing this course, students should be able to

• Understand the terminology of signals and basic engineering systems.
• Understand the role of signals and systems in engineering design and society.
• Understand signal representation techniques and signal characteristics.
• Understand the difference and the applications of analog versus discrete signals and the Conversion between them.
• Understand the process of sampling &Fourier transforms.

Text Books:

• Signals and Systems Allan V.Oppenheim, S.Wilsky and S.H.Nawab Pearson Education
• Signal and system 3rd Edition A. Anandkumar PHI

Reference Books

• Signal and system Rao TMH
• Signals and Systems Simon Haykins and Barry Van Veen: John Wiley & sons

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to understand the classification of signals and systems.	Goal04(quality education)	

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SEMESTER- 4th **Subject Code:3TBEC403**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Integrated Circuits & its Applications **Theory Min. Marks**:17

COURSE OBJECTIVE:

The objective of this course is to deal with integrated circuits which are imperative and versatile requirement in today's electronics. Operational amplifier is a device which is used in various electronics application, such as summer, integrator and differentiator and so on. This course comprehends the introduction of various IC's such as IC-741, TL082, and IC-555 timer. The course also deals with the analysis and design of circuits including analog signal processing using linear ICs.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Feedback Amplifier and Oscillators: Concept of feedback and their types, Amplifier with negative feedback and its advantages. Feedback Topologies. Oscillators: Concept of Positive feedback, Classification of Oscillators, Barkhausen criterion, Types of oscillators: RC oscillator, RC Phase Shift, Wien Bridge Oscillators. LC Oscillator: Hartley, Colpitt's, Clapp and Crystal oscillator.	Classroom teaching ICT tools and Google classroom
Unit – II	Introduction to integrated circuits: Advantages and characteristic parameters of IC's, basic building components, data sheets, Operational Amplifier: Differential amplifier and analysis, Configurations- Dual input balanced output differential amplifier, Dual input Unbalanced output differential amplifier, Single input balanced output differential amplifier, Single input Unbalanced output differential amplifier Introduction of op-amp, Block diagram, characteristics and equivalent circuits of an ideal op-amp, Power supply configurations for OP-AMP.	Classroom teaching ICT tools and Google classroom
Unit – III	Characteristics of op-amp: Ideal and Practical, Input offset voltage, offset current, Input bias current, Output offset voltage, thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio (CMRR), Slew rate and its Effect, PSRR and gain bandwidth product, frequency limitations and compensations, transient response, analysis of TL082 datasheet.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	OP-AMP applications: Inverting and non-inverting amplifier configurations, Summing amplifier, Integrators and differentiators, Instrumentation amplifier, Differential input and differential output amplifier, Voltage-series feedback amplifier, Voltage-shunt feedback amplifier, Log/ Antilog amplifier, Triangular/rectangular wave generator, phase-shift oscillators, Wein bridge oscillator, analog multiplier-MPY634, VCO, Comparator, Zero Crossing Detector. OP-AMP AS FILTERS: Characteristics of filters, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter characteristics, Band reject filters, Notch filter; all pass filters, self-tuned filters, AGC,AVC using op-AMP.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	TIMER:IC-555 Timer concept, Block pin configuration of timer. Monostable, Bistable and Astable Multivibrator using timer 555-IC,Schmitt Trigger, Voltage limiters, Clipper and clampers circuits, Absolute value output circuit, Peak detector, Sample and hold Circuit, Precision rectifiers, Voltage-to-current converter, Current-to-voltage converter. Voltage Regulator: simple OP-AMP Voltage regulator, Fixed and Adjustable Voltage Regulators, Dual Power supply, Basic Switching Regulator and characteristics of standard regulator ICs.	Classroom teaching, ICT Based and individual presentation and Google classroom

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List of Experiments:

- To determine voltage gain and frequency response of inverting and non-inverting amplifiers using IC-741.
- To measure offset voltages, bias currents, CMRR, Slew Rate of OPAMP using IC-741.
- To design an instrumentation amplifier and determine its voltage gain using IC-741.
- To design op-amp integrator (low pass filter) and determine its frequency response.
- To design op-amp differentiator (high pass filter) and determine its frequency response.
- To design Analog filters – I and II and analyse its characteristics.
- To design Astable, Monostable and Bistable multivibrator using IC-555and analyse its characteristics.
- Automatic Gain Control (AGC) Automatic Volume Control (AVC).

COURSE OUTCOME:

Upon successful completion of this course students will able to understand the working of different integrated circuits, their pin configurations and about their applications. Students will also able to understand the performance of ICs on practical basis.

Text Books:

- OP- Amp and linear Integrated circuits"Third edition-2006 Ramakant A. Gaikward Pearson
- Linear Integrated Circuits B. Visvesvara Rao Pearson

Reference Books

- Operational Amplifiers & Linear ICs David A. Bell: Oxford University Press, 2nd edition,2010.
- Analog Electronics Maheshwary and Anand PHI

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to design circuits for op-amp applications	Goal04(quality education) Goal09(Industry, Innovation and Infrastructure)	

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SEMESTER- 4th **Subject Code:3TBEC404**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Communication Systems I **Theory Min. Marks**:17

COURSE OBJECTIVE:

The course is designed to cover the fundamentals, principles, concepts, and techniques of analog communication systems like various modulation techniques, data transmission, communication technologies, time-domain and frequency domain multiplexing technique and noise analysis.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Frequency domain representation of signal: Fourier transform and its properties, condition of existence, Fourier transform of impulse, step, signum , cosine, sine, gate pulse, constant, properties of impulse function. Convolution theorem (time & frequency), correlation(auto & cross), energy & power spectral density.	Classroom teaching ICT tools and Google classroom
Unit – II	Introduction: Overview of Communication system, Communication channels Need for modulation, Baseband and Pass band signals, Amplitude Modulation: Double side band with Carrier (DSB-C), Double side band without Carrier, Single Side Band Modulation, DSB-SC, DSB-C, SSB-SC, Generation of AM, DSB-SC, SSB-SC, VSB-SC & its detection, Vestigial Side Band (VSB).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Types of angle modulation, narrowband FM,wideband FM, its frequency spectrum, transmission BW, methods of generation (Direct & Indirect), detection of FM (discriminators: balanced, phase shift and PLL detector),pre emphasis and de-emphasis. FM transmitter & receiver: Block diagram ofFM transmitter& receiver, AGC, AVC, AFC.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	AM transmitter& receiver: Tuned radio receiver &super heterodyne, limitation of TRF, IF frequency, image signal rejection, selectivity, sensitivity and fidelity ,Noise in AM, FM.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Noise: Classification of noise, Sources of noise, Noise figure and Noise temperature, Noise bandwidth, Noise figure measurement, Noise in analog modulation, Figure of merit for various AM andFM, effect of noise on AM &FM receivers.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

- To analyze characteristics of AM modulator & Demodulators.
- To analyze characteristics of FM modulators& Demodulators.
- To analyze characteristics of super heterodyne receivers.
- To analyze characteristics of FM receivers.
- To construct and verify pre emphasis and de-emphasis and plot the wave forms.
- To analyze characteristics of Automatic volume control and Automatic frequency control.
- To construct frequency multiplier circuit and to observe the waveform.
- To design and analyze characteristics of FM modulator and AM Demodulator using PLL.

Course outcome:

After the completion of the course students will be able to

- Describe different types of noise and predict its effect on various analog communication systems.
- Analyze energy and power spectral density of the signal. Express the basic concepts of analog modulation schemes
- Evaluate analog modulated waveform in time /frequency domain and also find modulation index.

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• Develop understanding about performance of analog communication systems Calculate bandwidth and power requirements for analog systems.
• Analyze different characteristics of receiver.

Text Books:

• Communication System Simon Haykins John Willy
• Communication System Singh & Sapre TMH

Reference Books

• Modern Digital and analog communication system B.P. Lathi TMH
• Analog communication Rao TMH
• Communication System Taub& shilling, TMH

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
FM Engineer in Telecomm. Industry	Able to draw spectral plots and visualize signals in frequency domain	Goal04(quality education)	

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SEMESTER- 4th **Subject Code:3TBEC405**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Control Systems **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To provide sound knowledge in the basic concepts of linear control theory and design of control system.
- To understand the methods of representation of systems and getting their transfer function models.
- To provide adequate knowledge in the time response of systems and steady state error analysis.
- To give basic knowledge is obtaining the open loop and closed–loop frequency responses of systems.
- To understand the concept of stability of control system and methods of stability analysis.
- To study the various ways of designing compensation for a control system.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Control system: Terminology and classification of control system, examples of control system, mathematical modeling of mechanical and electrical systems, differential equations, transfer function, block diagram representation and reduction, signal flow graph techniques. Feedback characteristics of control systems Open loop and closed loop systems, effect of feedback on control system and on external disturbances, linearization effect of feedback, regenerative feedback	Classroom teaching ICT tools and Google classroom
Unit – II	Time response analysis Standard test signals, time response of 1st order system, time response of 2nd order system, steady-state errors and error constants, effects of additions of poles and zeros to open loop and closed loop system. Time domain stability analysis Concept of stability of linear systems, effects of location of poles on stability, necessary conditions for stability, Routh-Hurwitz stability criteria, relative stability analysis, Root Locus concept, guidelines for sketching Root-Locus.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Frequency response analysis Correlation between time and frequency response, Polar plots, Bode Plots, all-pass and minimum-phase systems, log-magnitude versus Phase-Plots, closed-loop frequency response. Frequency domain stability analysis : Nyquist stability criterion, assessment of relative stability using Nyquist plot and Bode plot (phase margin, gain margin and stability).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Approaches to system design Design problem, types of compensation techniques, design of phase-lag, phase lead and phase lead-lag compensators in time and frequency domain, proportional, derivative, integral and Composite Controllers.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	State space representation of systems, block diagram for state equation, transfer function decomposition, solution of state equation, transfer matrix, relationship between state equation and transfer function, controllability and observability.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

Control System performance analysis and applications of MATLAB in Control system performance analysis & design.

Course outcome:

Students who are successful in this class will demonstrate at least the abilities to:

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• Demonstrate an understanding of the fundamentals of (feedback) control systems.
• Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
• Express and solve system equations in state-variable form (state variable models).
• Determine the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some extent, ramp) inputs.
• Determine the (absolute) stability of a closed-loop control system
• Apply root-locus technique to analyze and design control system.

Text Books:

• Control Systems Engineering I.J. Nagrath and M. Gopal, New Age International Publishers, 2003
• Automatic Control systems Benjamin C. Kuo Wiley India Pvt. Ltd, 9th edition

Reference Books

• Linear control system B.S. Manke Khanna publishers
• Control Systems A. Anand Kumar PHI, New Delhi, 2007

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to do the mathematical modeling of control system	Goal04(quality education)	

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SEMESTER- 4th
Course: BE ECE
SUBJECT: Simulation Lab

Subject Code:3TBEC406
Theory Max. Marks:25
Theory Min. Marks:12

Syllabus:

ADVANCED SIMULATION/ VERIFICATION SOFTWARE

Study of simulation/ verification software (any one- LAB-VIEW/KTECHLAB/ GNU CIRCUIT ANALYSIS PACKAGE/ LOGISIM/ MULTISIM/ SCILAB etc).

Overview and Study of the key features and applications of the software.

Application of the software in the field of Electronic Circuits, Digital Electronics and Analog Communication. Design, Optimization, simulation and verification of

1. Electronic circuits (example amplifiers, oscillators etc).
2. Realization and verification of various digital electronic circuits (example logic gates, adders, subtractors etc)
3. Realization of various signals and communication link etc.

Students should simulate and verify at least six circuits they are learning in the current semester.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to know about realization and verification of various digital electronic circuits	Goal04(quality education)	

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SEMESTER- 4th **Subject Code:3STEC407**

Course: BE ECE

SUBJECT: Home Appliances Repairing

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: Conductors, resisters and insulators, materials there of copper and aluminum conductors stranded conductors, current capacity, measurement of wires sizes, gauge. To study D.C. and A.C. supplies on CRO and study amplitude and frequency relation between voltage, current and resisters in D.C. Circuits impedance measurement in A.C., R.L.C. circuit. To measure power drawn and power factor of R.L.C. circuit. Power and energy drawn by Series and parallel circuits. Effects of electric current, Electromagnet, Inductors, Capacitors, Series Parallel connections. Study and use of voltmeter, ammeter, wattmeter, and energy meter, tong-tester, multimeter, megger, earth resistance meter, familiarization of sub-station.	Classroom teaching ICT tools and Google classroom
Unit – II	Lighting: Practicable methods of producing light by electricity. Arc lamps and their uses. Filament Lamps: Carbon and tungsten, coiled coil, gas filled lamps, effect of variation of voltage on tungsten filament lamps. Discharge lamps: Sodium vapour, mercury vapour lamps and metal halide lamps, ultra violet lamps, cold cathode neon lamps, fluorescent lamps, compact fluorescent lamps (CFLS).Heating: Immersion heaters without control and geysers with control-Thermostat, Instant-Water Heaters, Electric-Iron, Electric Range, temperature control, Cook top and Oven Air Circulating: Table fans, ceiling fans, regulators, R.L. and electronic. Air coolers, speed control, Exhaust Fans. Refrigerators - Electric circuit and main components. Water coolers. Air-Conditioners – Types Window, Electric circuit and main components. Split-Air, Electric circuit and main components.	Classroom teaching ICT tools and Google classroom
Unit – III	Pumping: Mono-block pumps, jet-pumps and submersible pumps and their uses.Single phase motors for water pumps, single-phase motor starters with over current and no-volt protection.Three Phase motors speed and slip, three Phase motor starters, DOL, Star-delta starters, manual, semi-automatic, over-current and under voltage protection. Mixing machines – speed control washing machines	Classroom teaching ICT tools and Google classroom
Unit – IV	Lead Acid Battery: Construction, charge and discharge process and specific gravity of electrolyte. Connection and operation of Battery charger unit from A.C. Mains.	Classroom teaching ICT tools and Google classroom
Unit - V	Safety in the use of appliances: Earthing of Appliances and know your electricity bill. Physiology of Electric shocks: - Effects of electric current through human body, respiration and blood circulation cardio pulmonary resuscitation, Kiss of life and blood circulation, Pressure of life.	Classroom teaching ICT tools and Google classroom

List of Experiments:

- Electronic Component and ICs Identifications, Testing, Measurement, Equipment's used and their applications in VCD- DVD Player and Home Theatre System.
- Installation Practice of Equipment's used in VCD-DVD Player and Home Theatre System
- Fault Diagnosis and Error Remover Techniques and Practices of VCD-DVD Player and Home Theatre System
- Electronic Component and ICs Identifications, Testing, Measurement and their applications in FM Radio Cordless

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Phone and Hair-Dryer

- Installation Practice of FM Radio Cordless Phone and Hair-Dryer
- Fault Diagnosis and Error Remover Techniques and Practices of FM Radio Cordless Phone and Hair-Dryer
- Electronic Component and ICs Identifications, Testing, Measurement and their applications in Induction Stove and Microwave Oven.
- Installation Practice of Induction Stove and Microwave Oven.
- Fault Diagnosis and Error Remover Techniques and Practices of Induction Stove and Microwave Oven
- Installation Practice and Wiring of Stabilizer, CVT, Inverter and UPS.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Get the knowledge of safety of appliances	Goal04(quality education)	

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SEMESTER- 4th **Subject Code: 3STEC407**

Course: BE ECE

SUBJECT: House Wiring

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Identification and use different types of tools like Basic tools: Combination pliers, screw driver set, line tester, nose pliers, ball pane, cross pin, sledge hammers, electric knife, etc. Measuring tools: Measuring tape, analog meters, digital meters, wire gauge, trisquare etc. Cutting & chasing tools: Hand saw, tennon saw, knife, chisels, drilling tools, etc. Power tools: Drilling machine, chasing machine, cutting machine, demolition machine, etc. Testing tools: Test lamp, digital multimeter, clamp meter, line tester 500v, test lamp, etc.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Symbols: symbols of different type of electrical element and equipment and machinery a Safety element :-fuse , MCB , RCD & earthling. Explain the safety precautions Know precautions to be taken to prevent electric shock. Explain causes of electric shocks, effects and shock treatment. Demonstrate Cardio-Pulmonary Resuscitation (CPR).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Wiring system – Types, testing, earthing, distribution etc Conductors and Insulators – Define a conductor and an insulator Differentiate between a conductor and an insulator State the materials used for a conductor and an insulator Understand the properties of a conductor and an insulator and their uses	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Series and Parallel circuit Introduction with an electric circuit Understand various types of circuits Compare Series and Parallel connections Draw a circuit diagram and solve simple calculation	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Voltage, Current, Power Introduction of work, power and energy and their units. Distinguish between work, power and energy. Calculate the power and energy consumption. Calculation of Power of home. Study of multi meter:- introduction of multimeter & use of multimeter.	Classroom teaching, ICT Based and individual presentation and Google classroom

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Get the knowledge of wiring system	Goal04(quality education)	

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SEMESTER- 5th
Course: BE ECE
SUBJECT: Solid State Devices

Subject Code:3TBEC501
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To understand basics of semiconductor material.
- To understand types of materials and their properties. Types of components.
- Laws related to conduction of electron.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction, Evolution and uniqueness of Semiconductor Technology, Equilibrium carrier concentration Thermal Equilibrium and wave particle duality Intrinsic semiconductor ø Bond and band models Extrinsic semiconductor ø Bond and band models, Carrier transport Random motion Drift and diffusion, Excess carriers Injection level Lifetime Direct and indirect semiconductors.	Classroom teaching ICT tools and Google classroom
Unit – II	Procedure for analyzing semiconductor devices Basic equations and approximations, P-N Junction Device structure and fabrication Equilibrium picture DC forward and reverse characteristics Small-signal equivalent circuit Switching characteristics Solar cell.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Bipolar Junction Transistor History Device structures and fabrication Transistor action and amplification Common emitter DC characteristics Small-signal Equivalent circuit Ebers-Moll model SPICE model, MOS Junction C-V characteristics, threshold voltage, body effect.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Metal Oxide Field Effect Transistor History Device structures and fabrication Common source DC characteristics Small-signal equivalent circuit SPICE level-1 model, Differences between a MOSFET and a BJT.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Junction FET and MESFET, Recent Developments Heterojunction FET Hetrojunction bipolar transistor, Summary.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

- Understand the nature of semiconducting materials
- Understand the physics that influences the presence of charge carriers in a semiconductor
- Describe the factors that influence the flow of charge in semiconductors
- Describe the operation of semiconductor devices
- Calculate voltage and current changes in semiconductor devices

Text Books:

- Solid State Electronic Devices Ben G. Streetman and Sanjay Kumar Banerjee Pearson, 6/e, 2010
- Fundamentals of Semiconductor Devices Achuthan, K N Bhat McGraw Hill,2015

Reference Books

- Solid State Electronic Devices Bhattacharya Sharma Oxford University Press, 2012
- Solid State Devices Rita John McGraw-Hill, 2014
- Semiconductor Devices : Modelling and Technology Dasgupta and Dasgupta PHI • Solid state devices S. Karmalkar

http://textofvideo.nptel.iitm.ac.in/video.php?courseId=117106091

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Principal
Dr.C.V.Raman Institute of Science & Technology
Kargi Road,Kota
Dist. Bilaspur(C.G.)

Deputy Registrar (Academic)
Dr. C.V. Raman University
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Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to gain the knowledge of semiconductor material	Goal04(quality education)	

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SEMESTER- 5th **Subject Code:3TBEC502**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Communication System-II **Theory Min. Marks**:17

COURSE OBJECTIVE:

The course is designed to cover the fundamentals, principles, concepts, and techniques of Digital communication systems like various modulation techniques, data transmission, communication technologies, time-domain and frequency domain multiplexing technique and noise analysis.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Random variables Cumulative distribution function, Probability density function, Mean, Variance and standard deviations of random variable, Gaussian distribution, Error function, Correlation and autocorrelation, Central-limit theorem, Error probability, Power Spectral density of digital data.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Digital conversion of Analog Signals Sampling theorem, sampling of band pass signals, Pulse Amplitude Modulation (PAM), types of sampling (natural, flat-top), equalization, signal reconstruction and reconstruction filters, aliasing and anti-aliasing filter, Pulse Width Modulation (PWM), Pulse Position Modulation (PPM). Digital transmission of Analog Signals Quantization, quantization error, Pulse Code Modulation (PCM), companding, scrambling, TDM-PCM, Differential PCM, Delta modulation, Adaptive Delta modulation, vocoders.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Digital Transmission Techniques Phase shift Keying (PSK)- Binary PSK, differential PSK, differentially encoded PSK, Quadrature PSK, M-ary PSK. Frequency Shift Keying (FSK)- Binary FSK (orthogonal and non-orthogonal), M-ary FSK Comparison of BPSK and BFSK, Quadrature Amplitude Shift Keying (QASK), Minimum Shift Keying (MSK).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Other Digital Techniques Pulse shaping to reduce inter channel and inter symbol interference- Duo binary encoding, Nyquist Criterion and partial response signaling, Quadrature Partial Response (QPR) encoder decoder. Regenerative Repeater- eye pattern, equalizers. Optimum Reception of Digital Signals Baseband signal receiver, probability of error, maximum likelihood detector, Bayes theorem, optimum receiver for both baseband and pass band receiver-matched filter and correlator, probability of error calculation for BPSK and BFSK.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Information Theory Source Coding: Introduction to information theory, uncertainty and information, average mutual information and entropy, source coding theorem, Huffman coding, Shannon-Fano-Elias coding, Channel Coding: Introduction, channel models, channel capacity, channel coding, information capacity theorem, Shannon limit.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

- Study of Sampling Process and Signal Reconstruction and Aliasing.
- Study of PAM, PPM and PDM.
- Study of PCM Transmitter and Receiver.

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• Time Division Multiplexing (TDM) and Demultiplexing.
• Study of ASK, PSK and FSK Transmitter and Receiver.

Course outcome:

Students who are successful in this class will demonstrate at least the abilities to:
• Solve communication engineering Problems using the knowledge of time domain & frequency domain.
• Analyze various Digital modulation schemes for communication systems.
• Analyze and compare the noise performance of various Digital communication systems.
• Understand the basic of digital transmission system.

Reference Books

• Modern Digital and Analog Communication Systems Lathi Oxford University Press
• Communication Systems Simon Haykins John Wiley
• Principles of Communication Systems Taub and Schilling TMH
• Digital Communications Rao TMH

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Design Engineer in TV Broadcasting	Able to learn about pulse modulation and pulse code modulation	Goal04(quality education) Goal09(Industry, Innovation and Infrastructure)	

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SEMESTER- 5th **Subject Code:3TBEC503**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Microprocessors and Microcontrollers **Theory Min. Marks**:17

COURSE OBJECTIVE:

To introduce to students the basics of microprocessor and microcontroller Programming and their applications. Developing of assembly level programs and providing the basics of the processors. To provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems. To assist the students with an academic environment aware of excellence guidelines and lifelong learning needed for a successful professional carrier.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Architecture of 8086 Microprocessor BIU and EU, register organization, pin diagram, memory organization, clock generator 8284, buffers and latches, 8288 bus controller, maximum and minimum modes.	Classroom teaching ICT tools and Google classroom
Unit – II	Assembly Language Programming of 8086 Instruction formats, addressing modes, instruction set, assembly language programming, ALP tools- editor, assembler, linker, locator, debugger, emulator. 8086 based multiprocessor systems Interconnection topologies, coprocessors 8087 NDP, I/O processors 8089 IOP, bus arbitration and control, lightly and tightly coupled systems.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Peripheral devices and their interfacing Memory interfacing, Programmable input/output ports 8255, Programmable interval timer 8253, keyboard/ display controller 8279, CRT controller 8275, Programmable communication interface 8251 USART.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Interrupts of 8086 Interrupts and interrupt service routine, interrupt cycle, maskable and non-maskable interrupts, interrupt programming. Programmable interrupt controller 8259. DMA in 8086 Basic DMA operation, modes of DMA transfer, DMA controller 8257.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	8051 Microcontroller Features, architecture, Pin Diagram, memory organization, external memory interfacing, instruction syntax, data types, subroutines, addressing Modes, instruction set, ALP of 8051. Applications of 8051.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

- Assembly Language Programs of Microprocessor 8086.
- Assembly Language Programs of Microcontroller 8051.
- Assembly Language Programs for Interfacing Chips.

Course outcome:

The students will be equipped with the basic knowledge of microprocessor and microcontroller interfacing and their applications.

- To familiarize with the assembly level programming.
- Design circuits for various applications using microcontrollers.
- An in-depth knowledge of applying the concepts on real- time applications.

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Reference Books

- Advanced microprocessors and peripherals Ray and Bhurchandi TMH
- The 8051 Microcontroller and Embedded Systems Mazidi and Mazidi Pearson Education

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Project Engineer in Embedded based Company	Gain knowledge about architecture of advance microprocessors, interface the 8086 microprocessor to the outside world	Goal04(quality education) Goal09(Industry,Innovation and Infrastructure)	

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SEMESTER- 5th **Subject Code:3TBEC504**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Communication Networks and Transmission Lines **Theory Min. Marks**:17

COURSE OBJECTIVE:

The course gives a strong foundation on the theory of transmission line and networks by highlighting their applications. This course deals with transmission line parameters, lossy and lossless lines, matching of transmission lines to their loads. This course gives idea about Smith Chart, Single and double stub matching and field analysis of transmission lines and waveguides. This course introduces different types of passive filters, Attenuators and Equalizers.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Characteristic Parameters of symmetrical and asymmetrical two port networks and their design Image impedance, iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient , iterative transfer coefficient, Lattice and Bridged T networks, reactive matching networks, matching techniques, insertion loss, symmetrical and asymmetrical attenuators and their design.	Classroom teaching ICT tools and Google classroom
Unit – II	Passive LC Filters Analysis and design of Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, Filter specifications, Butterworth approximation, Chebyshev approximation, elliptic function approximation, frequency transformation.	Classroom teaching ICT tools and Google classroom
Unit – III	Positive real function LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune's method, Bott-Duffin method, Synthesis-Coefficient.	Classroom teaching ICT tools and Google classroom
Unit – IV	Transmission line fundamentals Lumped parameter equivalent, voltage and current on a transmission line, infinite line, characteristic impedance and propagation constant, waveform distortion, attenuation and phase equalizers, distortion-less line, loading, liner reflection on a line, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection loss, insertion loss, T and π equivalents of a line, location of line fault, construction and design of two wire line and coaxial cable.	Classroom teaching ICT tools and Google classroom
Unit - V	Line at radio frequencies Parameters of line and coaxial cable at radio frequencies, dissipation-less line, voltage and current on a dissipation-less line, standing waves, standing wave ratio, input impedance of open circuit and short circuit, power and impedance measurement on lines, eighth-wave, quarter-wave and half wave line, circle diagram, Smith chart, solution of problems using Smith chart, single and double stub matching. introduction to micro-strip lines and its analysis.	Classroom teaching ICT tools and Google classroom

List of Experiments:

- To set up the standing waves formation on a transmission line and observe their maxima and minima using frequency domain method.
- To measure the characteristic impedance of transmission lines using frequency domain method and to differentiate between the matched and unmatched lines.
- To measure the VSWR, reflection coefficient and return loss in a transmission line.
- To measure the dielectric constant of insulator in the transmission line.
- To measure the velocity of propagation and wavelength in the given transmission line.

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• To study the attenuation characteristics of signal along a transmission line and observe its variation with frequency. Also calculate the phase constant and propagation constant.
• To study the effect of reactive loads on transmission lines.
• To study the difference between lossy and loss less line.
• To study the physical dimensions of transmission line and estimation of characteristic Impedance.
• To study behavior of infinite and short lines.
• To study the operation of Balun transformer.
• To study the loading of transmission lines and estimate the cut off frequency of a loaded line.
• To study the use of coaxial lines as tuned circuits and delay lines.
• To study the input and output impedance of any RF circuits and match it to 50/75 ohms.
• Simulation of various filters

Course outcome:

• To become familiar with propagation of signals through lines.
• Calculation of various line parameters by conventional and graphical methods.
• Need for impedance matching and different impedance matching techniques.
• Design of different types of filters, equalizer and attenuators.

Reference Books

• Networks and Transmission Lines RyderPHI Learning
• Introduction to Modern Network synthesis Valkenberg Wiley India
• Electromagnetic Waves and Transmission Lines Rao PHI learning

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Microwave Engineer and Broadcast Engineer in Telecomm and TV Broadcasting Industries.	Gain knowledge about signal transmission, parameters associated with transmission line; measure of various losses and techniques to reduce those losses.	Goal04(quality education)	

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SEMESTER- 5th **Subject Code:3TBEC505**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Electromagnetic Theory **Theory Min. Marks**:17

COURSE OBJECTIVE:
To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields. To lay the foundations of electromagnetism and its practice in modern communications such as wireless, guided wave principles such as fiber optics and electronic electromagnetic structures.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Review of vector calculus: Orthogonal coordinate systems, gradient, divergence and curl. Laplacian operator for scalar and vectors. Vector integral and differential identities and theorems. Phasor representation of harmonic variation of scalar and vectors Static electric fields, Columb's law, electric flux density and electric field intensity, permittivity, dielectric constant, field of distributed charges in free space, potential function, Laplace's and Poisson's equations, electric dipole, stored electric energy density. Boundary conditions at abrupt discontinuities between two media including conducting boundaries, surface charge distribution capacitance between two isolated conductors.	Classroom teaching ICT tools and Google classroom
Unit – II	Solution of Laplace's equations In systems of dielectric and conducting boundaries, uniqueness theorem, two dimensional boundary condition problems, solution by symmetry, conformal transformation of functions, image theory etc. fields in parallel wire, parallel plane and coaxial systems. Static currents and magnetic fields- flow of charge in conductive media, lossy conductive medium, current density, specific conductivity, mobility, explanation of Ohm's law employing mobility. Magnetic effects of current flow, Biot-Savart's law in vector form magnetic field intensity, magnetic flux, and permeability, closed loop currents, Ampere's circuital law in integral and differential vector form, magnetic vector potential and related equations. Problems related to straight wire toroidal and cylindrical solenoids, inductance. Boundary conditions on magnetic field, equivalent surface currents for abrupt discontinuity of magnetic field.	Classroom teaching ICT tools and Google classroom
Unit – III	Time varying fields – Faraday's law in integral and differential forms, displacement current concept, Maxwell's equations in differential and integral forms, wave equations in source free region electric and magnetic stored energy density, continuity equation, Poynting vector theorem.Time harmonic fields, r.m.s. phasor representation of field vectors, Maxwell's equations for TH field, average energy density, complex Poynting vector, duality concept.Helmholtz wave equation, general solution in free space in various coordinates, plane polarized wave in free space, properties of plane waves, wave front, power flow, stored energy density.	Classroom teaching ICT tools and Google classroom
Unit – IV	Circular and elliptic polarization, Resolution in terms of linear polarized waves and vice- versa. Plane waves in lossy medium, low loss dielectric, good conducting and ionized media, complex permittivity, loss tangent, skin depth, transmission line analogy, boundary conditions at perfect conductor surface, surface current density Interference of two plane waves traveling at oblique directions.	Classroom teaching ICT tools and Google classroom
Unit - V	Reflection and refraction of plane waves at dielectric media and conducting Surfaces, Brewster's angle, total internal reflection, resultant fields and power flow in both media. Frequency dispersive propagation, phase velocity and group	Classroom teaching ICT tools and Google classroom

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Dr. C.V. Raman University
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	velocity. Magnetic vector potential for sources in free space, retarded potential, radiation principles, boundary condition at infinity.	

Course outcome:

After the successful completion of the course student should be able to:

- Apply vector calculus to static electric-magnetic fields in different engineering situations.
- Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems.
- Examine the phenomena of wave propagation in different media and its interfaces and in applications of microwave engineering.
- Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications.

Reference Books

- Elements of Electromagnetic Mathew N.O Sadiku Oxford University Press
- Electromagnetics John D. Kraus: Mc. Graw Hill.
- Engineering Electromagnetic William H. Hayt: TMH

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to learn and apply concepts of polarization and vector calculus to solve electric and magnetic field problems	Goal04(quality education)	

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SEMESTER- 5th
Course: BE ECE
SUBJECT: Software Lab- III

Subject Code: 3TBEC506
Theory Max. Marks:25
Theory Min. Marks:12

Study of simulation software (any one Scilab/ MatLab etc.)

Introduction to Scilab / Matab, Study of Scilab / Matlab programming environment, Modeling, Design and development of Programs. Overview and Study of the key features and applications of the software. Application of the software in the field of Control Systems, Data Communications and Communication Systems.

1. Programs Related to Control System- open-loop and closed loop control system, frequency response plots, determining transient response, specifications of second order system, effect of PID controller on control system, Bode plot, Nyquist plot and Root Locus plot, state space analysis.

2. Programs Related to Communication Systems--Simulation of a Communication System (Generation, addition of noise and Detection), AM, FM, PM, PAM, PCM, PSK, FSK etc.

3. Programs related to Data Communications- simulations of CRC, LRC, VRC, hamming codes, line encoding techniques.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to get the knowledge about simulation of different communication signals	Goal04(quality education)	

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SEMESTER- 5th **Subject Code:3STEC507**
Course: BE ECE
SUBJECT: Linux-Unix

COURSE OBJECTIVE:

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to UNIX & LINUX, Using essential tools for handling files, directories, command-line, Create and Configure local storage using partitions and logical volumes.	Classroom teaching ICT tools and Google classroom
Unit – II	Operate and manage running systems, including booting into different run levels, identifying processes, managing virtual machines, and controlling services.	Classroom teaching ICT tools and Google classroom
Unit – III	Create and configure file systems and their attributes, such as permissions, encryption, access control lists, and network file systems.	Classroom teaching ICT tools and Google classroom
Unit – IV	Create and Manage users and groups, including use of a centralized directory for authentication. Change passwords and adjust password aging for local user accounts, Create, delete, and modify local groups and group memberships Configure a system to use an existing authentication service for user and group information.	Classroom teaching ICT tools and Google classroom
Unit - V	Configure and Manage security, including basic firewall and SELinux configuration. Deploy, configure, and maintain systems, including software installation, update, and core services	Classroom teaching ICT tools and Google classroom

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Software developer	Understand the concept of operate and mange the running system	Goal04(quality education)	

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SEMESTER- 5th **Subject Code:3STEC507**

Course: BE ECE

SUBJECT: Embedded systems

COURSE OBJECTIVE:

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Embedded system introduction to embedded system, embedded system architecture, classifications of embedded systems, challenges and design issues in embedded systems, fundamentals of embedded processor and microcontrollers, CISC vs. RISC, fundamentals of Vonneuman/Harvard architectures, types of microcontrollers, selection of NPTEL http://nptel.ac.in Electronics & Communication Engineering Coordinators: PREETHAM JINUGA Department of Electronics and communication Engineering Freelancer microcontrollers.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Concepts of C programming C concepts and programming- data types, advanced data types- register, constants, IO operations, operators, operator precedence and associatively, Conditional statements & loops, arrays, single and double dimensional arrays, stings and string operations. Functions: Parameter passing- Pass by Value, Pass by Reference; creating modular programs using functions, Recursive functions. Structures & Unions: declaration, accessing members of structure, difference between structure and union, User Defined Data Types, Enumerated data type. Pointers: pointer basics and concepts, arrays and pointer relation, passing pointers to functions, dynamic memory allocation. Files and file operations. Linked lists, stacks and queues. Pre-processor directives, command line arguments.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Object oriented programming Differences between C and C++,Fundamentals of object oriented programming; OOP vs.Procedure oriented programming, OOP concepts:classes, objects, abstraction, polymorphism, inheritance, data binding and encapsulation. Basics of C++: features of C++, data types, standard I/O, arrays and strings in C++. Classes in C++, instantiation, creating objects and object scope, data abstraction, data encapsulation, constructors and destructors, methods and access modifiers, function and operator overloading Inheritance-Base and Derived classes, Inheritance types, Scope Resolution operator; polymorphism and virtual functions, exception handling.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	PIC Architecture Introduction to PIC microcontrollers, PIC architecture, comparison of PIC with other CISC and RISC based systems and microprocessors, memory mapping, assembly language programming, addressing modes, instruction set.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	I/O Programming PIC I/O ports, I/O bit manipulation programming, timers/counters, programming to generate delay and wave form generation, I/O programming, LEDs, 7segment led's, LCD and Keypad interfacing.	Classroom teaching, ICT Based and individual presentation and Google classroom

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Software Programmer, Embedded Engineer	Understand the concept of embedded system and PIC microcontroller	Goal04(quality education)	

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SEMESTER- 6th **Subject Code:3TBEC601**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Industrial Electronics **Theory Min. Marks**:17

COURSE OBJECTIVE:

The aim is to build on the information provide in Electronics systems and power electronics courses to provide an application perspective. The objective is to increase the understanding of power electronic fundamentals, applications and recent developments in the power electronics field.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Power Supplies Power supply, rectifiers (half wave, full wave), performance parameters of power supplies, filters (capacitor, inductor, inductor-capacitor, pi filter), bleeder resistor, voltage multipliers .Regulated power supplies (series and shunt voltage regulators, fixed and adjustable voltage regulators, current regulator), switched regulator (SMPS), comparison of linear and switched power supply, switch mode converter (fly back, buck, boost, buck-boost, buck converters).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Thyristor Silicon controlled rectifies (SCR), constructional features, principle of operation, SCR terminology, turn-on methods, turn-off methods, triggering methods of SCR circuits, types of commutation, comparison of thyristors and transistors, thermal characteristics of SCR, causes of damage to SCR, SCR overvoltage protection circuit, series and Parallel operation of SCRs, Line commutated converters (half wave rectifier with inductive and resistive load, single phase and three phase full wave rectifiers).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Other members of SCR family Triac, Diacs, Quadracs, recovery characteristics, fast recovery diodes, power diodes, power transistor, power MOSFET, Insulated gate bipolar transistor (IGBT), loss of power in semiconductor devices, comparison between power MOSFET, power transistor and power IGBT.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Applications of OP-AMP Basics of OP-AMP, relaxation oscillator, window comparator, Op-comp as rectangular to triangular pulse converter and vice- versa, Wien bridge oscillator, function generator, frequency response of OP-AMP, simplified circuit diagram of OP-AMP, power supplies using OP-AMP, filters (low-pass, high pass) using OP-AMP.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Programmable Logic Controller (PLC) Functions, applications, advantages and disadvantages of PLC over conventional relay controllers, comparison of PLC with process control computer system, factors to be considered in selecting PLC, functional block diagram of PLC, microprocessor in PLC, memory, input and output modules (interface cards), sequence of operations in a PLC, status of PLC, event driven device, ladder logic language, simple process control applications of PLC, Programming examples.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

By the end of this course, the student will

- Learn about the latest electronic devices available in industry.
- Be able to effectively provide detailed explanation to the structure and operation of common linear components.
- Learn about the digital ICs and sensory electronic devices

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- Use tools/test equipment to analyze electronic components
- Perform basic electronics troubleshooting
- Apply critical thinking in solving industrial electronic problems
- Perform electronics calculation
- Design basic electronic circuits
- Learn about industrial control devices
- Be able to understand the functions of transducer
- Gain some experience with operational amplifiers

Reference Books •

- Power Electronics Bhimbra Khanna Publishers
- Power Electronics- Circuits, devices and applications Rashid Pearson Education
- Industrial Electronics and control Bishwanath Paul PHI learning

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Instrumentation Engineer in Power plants	Get the knowledge of Thyristor and it's family and operation	Goal04(quality education)	

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SEMESTER- 6th | **Subject Code:3TBEC602**
Course: BE ECE | **Theory Max. Marks:50**
SUBJECT: Digital Signal Processing | **Theory Min. Marks**:17

COURSE OBJECTIVE:

This course will introduce the basic concepts and techniques for processing signals on a computer. By the end of the course, you be familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors. The course emphasizes intuitive understanding and practical implementations of the theoretical concepts.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Discrete-Time Signals and Systems Discrete-time signals, discrete-time systems, analysis of discrete-time linear time-invariant systems, discrete time systems described by difference equation, solution of difference equation, implementation of discrete-time systems, stability and causality, frequency domain representation of discrete time signals and systems.	Classroom teaching ICT tools and Google classroom
Unit – II	The z-Transform The direct z-transform, properties of the z-transform, rational z-transforms, inversion of the z transform, analysis of linear time-invariant systems in the z-domain, block diagrams and signal flow graph representation of digital network, matrix representation.	Classroom teaching ICT tools and Google classroom
Unit – III	Frequency Analysis of Discrete Time Signals Discrete Fourier series (DFS), properties of the DFS, discrete Fourier transforms (DFT), properties of DFT, two dimensional DFT, circular convolution.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Efficient Computation of the DFT FFT algorithms, decimation in time algorithm, decimation in frequency algorithm, decomposition for 'N' composite number.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Digital filters Design Techniques Design of IIR and FIR digital filters, Impulse invariant and bilinear transformation, windowing techniques-rectangular and other windows, examples of FIR filters, design using windowing.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

- Generation, analysis and plots of discrete-time signals. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding etc).
- Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality.
- Computation and plot of DTFT of sequences, verification of properties of DTFT.
- Computation and plots of z-transforms, verification of properties of z-transforms.
- Computation and plot of DFT of sequences, verification of properties of DFT. Computation and plots of linear/circular convolution of two sequences.
- Computation of radix-2 FFT- Decimation in time and Decimation in frequency.
- Implementation of IIR and FIR filter structures (direct, cascade, parallel etc).
- Implementation of various window design techniques (Rectangular, Bartlett, Hann, Hamming etc).

Course outcome:

By the end of the course the student will be able to:

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- Represent discrete-time signals analytically and visualize them in the time domain.
- Understand the meaning and implications of the properties of systems and signals.
- Understand the Transform domain and its significance and problems related tom computational complexity.
- Be able to specify and design any digital filters using MATLAB.

Reference Books

- Digital Signal Processing Oppenheim and Schafer: PHI Learning
- Digital Signal Processing Mazidi and Mazidi Pearson Education
- Introduction to Digital Signal Processing Johnny R. Johnson: PHI Learning

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Digital Signal Processing Engineer	Able to synthesize discrete time signals from analog signals, DFT and design IIR and FIR filters	Goal04(quality education)	

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SEMESTER- 6th
Course: BE ECE
SUBJECT: Antenna and Wave Propagation

Subject Code:3TBEC603
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To study various antennas, arrays and radiation patterns of antennas.
- To learn the basic working of antennas.
- To understand various techniques involved in various antenna parameter measurements.
- To understand the radio wave propagation in the atmosphere.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Radiation Potential function and the Electromagnetic field, potential functions for Sinusoidal Oscillations, retarded potential, the Alternating current element (or oscillating Electric Dipole), Power radiated by a current element, Application to short antennas, Assumed current distribution, Radiation from a Quarter wave-monopole or Half wave dipole, sine and cosine integral, Electromagnetic field close to an antenna, Solution of the potential equations, Far-field Approximation.	Classroom teaching ICT tools and Google classroom
Unit – II	Antenna Fundamentals Introduction, network theorems, directional properties of dipole antennas, travelling –wave antennas and effect of feed on standing-wave antennas, two – element array, horizontal patterns in broad-cast arrays, linear arrays, multiplication of patterns ,effect of earth on vertical patterns, Binomial array, antenna gain, effective area.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Types of antennas Babinet's principles and complementary antenna, horn antenna, parabolic reflector antenna, slot antenna, log periodic antenna, loop antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna, lens antenna, turnstile antenna. Long wire antenna: resonant and travelling wave antennas for different wave lengths, V-antenna, rhombic antenna, beverage antenna, microstrip antenna.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Antenna array synthesis Introduction, retarded potentials, array structures, weighting functions, linear array analysis, different forms of linear arrays, Schelknoff unit circle, linear array synthesis, sum and difference patterns, Dolph-Chebychev synthesis of sum pattern, Taylor synthesis of sum patterns, Bayliss synthesis of difference patterns, planar arrays, arrays with rectangular boundary.	Classroom teaching ICT tools and Google classroom
Unit - V	Propagation of radio waves Fundamentals of electromagnetic waves, effects of the environment, modes of propagation. Ground wave propagation- Introduction, plane earth reflection, space wave and surface wave, transition between surface and space wave, tilt of wave front due to ground losses.Space wave propagation- Introduction, field strength relation, effects of imperfect earth, curvature of earth and interference zone, shadowing effect of hills and buildings, absorption by atmospheric phenomena, variation of field strength with height, super refraction, scattering, tropospheric propagation, fading, path loss calculations. Sky wave propagation- Introduction, structural details of the ionosphere, wave propagation mechanism, refraction and reflection of sky waves by ionosphere, ray path, critical frequency, MUF, LUF, OF, virtual height, skip distance, relation between MUF and skip distance	Classroom teaching, ICT Based and individual presentation and Google classroom

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List of Experiments:

- To Plot the Radiation Pattern of an Omni Directional Antenna.
- To Plot the Radiation Pattern of a Directional Antenna.
- To Plot the Radiation Pattern of a Parabolic Reflector Antenna.
- To Plot the Radiation Pattern of a Log Periodic Antenna.
- To Plot the Radiation Pattern of a Patch Antenna.
- To Plot the Radiation Pattern of a Dipole/ Folded Dipole Antenna.
- To Plot the Radiation Pattern of a Yagi (3-EL/4EL) Antenna.
- To Plot the Radiation Pattern of a Monopole/ WHIP/ Collinear Antenna.
- To Plot the Radiation Pattern of a Broad site Antenna.
- To Plot the Radiation Pattern of a Square Loop Antenna.

Course outcome:

Upon successful completion of this course, students should be able to:

- To analyze the fundamentals of antenna theory.
- Understand the different types of antennas and the radiation mechanism.
- Frequencies from LF to Microwave applications.
- To expose students to examples of applications and various antenna types.
- Identify the atmospheric and terrestrial effects on radio wave propagation

Reference Books

- Antennas and wave propagation Krauss TMH
- Electronic Communication Systems Kennedy TMH
- Electromagnetic Waves and Radiating System Jordan and Balmain PHI Learning

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
RF Engineer , BTS Engineer and Microwave Engineer in Telecomm Sector	Gain the knowledge of wave propagation.	Goal04(quality education)	

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SEMESTER- 6th | **Subject Code:3TBEC604**
Course: BE ECE | **Theory Max. Marks:50**
SUBJECT: VLSI Circuits and Systems | **Theory Min. Marks:17**

COURSE OBJECTIVE:

- To bring both Circuits and System views on design together.
- It offers a profound understanding of the design of complex digital VLSI circuits, computer aided simulation and synthesis tool for hardware design.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction Introduction to CMOS VLSI circuit, VLSI design flow, Design strategies , Hierarachy, regularity, modularity, locality, MOS Transistor as a Switches, CMOS Logic, Combinational circuit, latches and register, Introduction of CAD Tool , Design entry, synthesis, functional simulation.	Classroom teaching ICT tools and Google classroom
Unit – II	Specification of sequential systems Characterizing equation & definition of synchronous sequential machines. Realization of state diagram and state table from verbal description, Mealy and Moore model machines state table and transition diagram. Minimization of the state table of completely and incompletely specified sequential machines.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Asynchronous Sequential Machine Introduction to asynchronous sequential machine, Fundamental mode and Pulse mode asynchronous sequential machine, Secondary state assignments in asynchronous sequential machine, races and hazards.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	State Machine Algorithmic state machine and fundamental concept of hardware/ firmware algorithms. Controllers and data system designing.	Classroom teaching ICT tools and Google classroom
Unit - V	Fault Detection in combinational circuit Types of faults, Fault detection using Boolean Difference and path sensitization method. Concept of PROM, PLA, PAL, CPLD and FPGA, PALASM software applications.	Classroom teaching ICT tools and Google classroom

List of Experiments:

- Write a Verilog/VHDL Code to implement a 4X1 MUX.- (a)Using If-Else Statement (b)Using case statement (c)Using conditional assignment statement
- Write a Verilog/VHDL code to implement a 2-bit wide 8X1 MUX-(a) Using If-Else Statement (b) Using case statement (C) Using conditional assignment statement
- Write Verilog/VHDL code to implement 6-bit comparator
- Write a Verilog/VHDL Code to implement a 4Bit Synchronous counter.
- Write Verilog/VHDL programs to implement an Up/Down counter
- Write a Verilog/VHDL Code to implement D flip-flop, using positive level triggering.
- Write a Verilog/VHDL Code to implement D flip-flop, using negative edge triggering.
- Write a Verilog/VHDL Code to implement JK flip-flop, using negative edge triggering.
- Write a Verilog/VHDL Code to implement, synthesize and simulate a 4 bit shift register.
- Write a Verilog/VHDL Code to implement 1011 non-overlapping sequence detector.
- Write a Verilog/VHDL Code to implement 1010 overlapping sequence detector.

Course outcome:

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After studying this course the students would gain enough knowledge.

To be aware about the trends in semiconductor technology, and how it impacts scaling and performance. Able to learn Layout, Stick diagrams, Fabrication steps, Static and Switching characteristics of inverters. Synthesis of digital VLSI systems from register-transfer or higher level descriptions in hardware design languages. To understand MOS transistor as a switch and its capacitance. Student will be able to design digital systems using MOS circuits.

Reference Books

- Principle of CMOS VLSI Design Neil Weste TMH
- Switching & Finite Automata Theory Kohavi TMH
- Digital Circuits and Logic Lee PHI Learning
- Fundamentals of Logic Design Roth Jr.: Jaico Publishing House

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Fabrication Engineer in Chip Designing Industry	Able to understand the concept of state machine and fault detection in combinational circuits.	Goal04(quality education) Goal09(Industry, Innovation and Infrastructure)	

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SEMESTER- 6th **Subject Code:3TBEC605**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Cellular Mobile Communication **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To have an overview of wireless and mobile communications in different generations.
- To study the operation of basic cellular system and performance criterion, handoff mechanism.
- To study the design of cellular mobile system.
- To develop the ability to search, select, organize and present information on new technologies in mobile and cellular communication.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to cellular mobile system A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning of cellular system. Elements of cellular radio system design General description of problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I in an Omni-directional antenna system, hand off mechanism, cell splitting, components of cellular systems.	Classroom teaching ICT tools and Google classroom
Unit – II	Cell coverage for signal and traffic General introduction, mobile point-to-point model, propagation over water or flat open area, foliage loss, propagation in near- in distance, long distance propagation, path loss from point-to-point prediction model, cell site antenna heights and signal coverage cells, mobile-to-mobile propagation. Cell site antennas and mobile antennas Equivalent circuits of antennas, gain and pattern relationship, sum and difference patterns, antennas at cell site, unique situations of cell site antennas, mobile antennas.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Co channel interference reduction Co channel interference, real time co channel interference measurement at mobile radio transceivers, design of antenna systems - Omni directional and directional, lowering the antenna height, reduction of co channel interference, umbrella- pattern effect, diversity receiver, designing a system to serve a predefined area that experiences co channel interference. Types of Non co channel interference Adjacent channel interference, near-end-far-end interference, effect on near-end mobile units, cross-talk, effects of coverage and interference by applying power decrease, antenna height decrease, beam tilting, effects of cell site components, interference between systems, UHF TV interference, long distance interference.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Frequency management and Channel Assignment Frequency management, frequency spectrum utilization, setup channels, channel assignment, fixed channel assignment, non-fixed channel assignment algorithms, additional spectrum, traffic and channel assignment, perception of call blocking from the subscribers. Handoffs and dropped calls Value of implementing handoffs, initiation of handoff, delaying a handoff, forced handoff, queuing of handoff, power- difference handoff, mobile assisted handoff and soft handoff, cell-site handoff and intersystem handoff, dropped call rate formula.	Classroom teaching, ICT Based and individual presentation and Google classroom

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Unit - V	Digital Cellular Systems GSM- architecture, layer modeling, transmission, GSM channels and channel modes, multiple access scheme. CDMA- terms of CDMA systems, output power limits and control, modulation characteristics, call processing, hand off procedures. Miscellaneous mobile systems- TDD systems, cordless phone, PDC, PCN, PCS, non cellular systems.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

- Students are capable to analyze and solve problems in the field of telecommunications.
- Students will have the understanding of different generations, operations and design of wireless and mobile communications.

Reference Books

- Cellular and Mobile Telecommunication- Analog & digital systems Lee TMH
- Wireless Communications- principles and practice Rappaport Pearson Education
- Mobile communications design fundamentals Lee Wiley India

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
BTS Engineer, MSC Engineer , RF Engineer and Operation & Maintanence Engineer in Telecomm. Industry	Have idea about the mobile network and telecommunication & broadcast system	Goal04(quality education) Goal09(Industry, Innovation and Infrastructure)	

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SEMESTER- 6th
Course: BE ECE
SUBJECT: Software Lab- IV

Subject Code:3TBEC606
Theory Max. Marks:25
Theory Min. Marks:12

VHDL

Hardware abstraction, Basic language elements: identifiers, data objects, data types, operators, behavioral modeling, data flow modeling, structural modeling, simulation and analysis.

VERILOG

Overview of digital design with Verilog, Hierarchical Modeling: basic concepts, models and ports, gate level modeling, data flow modeling, behavioral modeling, logic synthesis with Verilog HDL, simulation.

Experiments:

Design and simulation of following using Verilog/ VHDL . Logic gates: NAND, NOR, XOR, XNOR.

Half adder, full adder, subtractor, latches, multiplexers- 2:1, 4:1, 8:1, comparators, decoders- 2:4, 3:8, 4:16. 4-bit ripple carry full adder,4-bit Ripple carry counter, parity generator, up/down counters.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Understand the concept of VHDL and Verilog language	Goal04(quality education)	

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SEMESTER- 6th **Subject Code:3STEC607**

Course: BE ECE

SUBJECT: Python or App Development

COURSE OBJECTIVE:

Mathematics fundamental necessary to formulate, solve and analyze engineering problems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction History, Features, Setting up path, Working with Python Basic Syntax Variable and Data Types Operator, Conditional Statements If If- else Nested if-else, Looping For While Nested loops.	Classroom teaching ICT tools and Google classroom
Unit – II	Control Statements Break Continue Pass String Manipulation Accessing Strings Basic Operations String slices Function and Methods Lists Introduction Accessing list Operations Working with lists Function and Methods Tuple Introduction Accessing tuples Operations Working Functions and Methods	Classroom teaching ICT tools and Google classroom
Unit – III	Dictionaries Introduction Accessing values in dictionaries Working with dictionaries Properties Functions Functions Defining a function Calling a function Types of functions Function Arguments Anonymous functions Global and local variables Modules Importing module Math module Random module Packages Composition	Classroom teaching ICT tools and Google classroom
Unit – IV	Input-Output Printing on screen Reading data from keyboard Opening and closing file Reading and writing files Functions Exception Handling Exception Exception Handling Except clause Try ? finally clause User Defined Exceptions. Chairperson Dean (Registrar) (Board of Studies) (Academic Council) Seal	Classroom teaching ICT tools and Google classroom

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Software developer and App developer	Understand the concept of Dictionaries in Python	Goal04(quality education)	

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SEMESTER- 6th **Subject Code:3STEC607**

Course: BE ECE

SUBJECT: App Development

COURSE OBJECTIVE:

Mathematics fundamental necessary to formulate, solve and analyze engineering problems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Android. Smartphone features. Installing the SDK. Creating Android Emulator. Installing Eclipse. Installing Android development tools. Choosing which Android version to use.	Classroom teaching ICT tools and Google classroom
Unit – II	Android Life cycle. Android applications structure. Creating a project. Working with android manifest.XML Various controls. Layouts	Classroom teaching ICT tools and Google classroom
Unit – III	Text controls Button controls Images Supporting Multiple Screen, Activities. Application context. Intent WebView.	Classroom teaching ICT tools and Google classroom
Unit – IV	List View. Spinner AutoComplete Textview. Multi Auto Complete Textview. Toast. Dialogue Notification. Statusbar Notification.	Classroom teaching ICT tools and Google classroom
Unit – V	Option Menu. Context Menu. Google Map, File . Shared Preferences. Database(SQLite database) Creation of .apk files, Web services. HTTP client. XML and JSON	Classroom teaching ICT tools and Google classroom

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
App developer	Able to understand android life cycle	Goal04(quality education)	

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SEMESTER- 7th
Course: BE ECE
SUBJECT: Wireless Communication

Subject Code:3TBEC701
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To provide an overview of Wireless Communication networks area and its applications in communication engineering.
- To appreciate the contribution of Wireless Communication networks to overall technological growth.
- To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction Applications and requirements of wireless services: history, types of services, requirements for the services, economic and social aspects. Technical challenges in wireless communications: multipath propagation, spectrum limitations, limited energy, user mobility, noise and interference-limited systems. Propagation mechanism: free space loss, reflection and transmission, diffraction, scattering by rough surfaces, wave guiding.	Classroom teaching ICT tools and Google classroom
Unit – II	Wireless Propagation channels Statistical description of the wireless channel: time invariant and variant two path models, small-scale fading with and without a dominant component, Doppler spectra, temporal dependence of fading, large scale fading. Wideband and directional channel characteristics: causes of delay dispersion, system theoretic description of wireless channels, WSSUS model, condensed parameters, ultra-wideband channels, directional description.	Classroom teaching ICT tools and Google classroom
Unit – III	Channel models: Narrowband, wideband and directional models, deterministic channel-modeling methods. Channel sounding: Introduction, time domain measurements, frequency domain analysis, modified measurement methods, directionally resolved measurements. Antennas: Introduction, antennas for mobile stations, antennas for base stations.	Classroom teaching ICT tools and Google classroom
Unit – IV	Transceivers and signal processing: Structure of a wireless communication link: transceiver block structure, simplified models. Modulation formats, demodulator structure, error probability in AWGN channels, error probability in flat-fading channels, error probability in delay and frequency-dispersive fading channels.	Classroom teaching ICT tools and Google classroom
Unit – V	Diversity: Introduction, microdiversity, macrodiversity and simulcast, combination of signals, error probability in fading channels with diversity reception, transmit diversity. Equalizers: Introduction, linear equalizers, decision feedback equalizers, maximum likelihood sequence estimation (Viterbi detector), comparison of equalizer structures, fractional spaced equalizers, blind equalizers.	Classroom teaching ICT tools and Google classroom

Course outcome:

- To understand the basics of Wireless Communication Networks.
- To motivate the students to pursue research in the area of wireless communication.

Reference Books

- Wireless Communications Molisch Wiley India
- Wireless Communication Upena Dalal: Oxford University Press
- Modern Wireless Communication Haykin Pearson Education

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• Wireless Communication Rappaport Pearson Education

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Understand the concept of channel models and transceiver & signal processing	Goal04(quality education)	

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SEMESTER- 7th
Course: BE ECE
SUBJECT: Information Theory & Coding

Subject Code:3TBEC701
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To study the several source coding techniques.
- To study the channel coding theorem & various codes.
- To study about Block control coding.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Source Coding Model of signaling system - Mathematical models for information sources – Encoding a source alphabet – ASCII code – Radix r code – Miscellaneous codes - A Logarithmic measure of information – Coding for Discrete sources – Coding for analog sources (Optimum quantization) – Coding techniques for analog sources	Classroom teaching ICT tools and Google classroom
Unit – II	Error Detecting and Error Correcting Codes Simple parity checks – CRC codes – Hamming weight – Hamming distance – Minimum distance decoding – Single / Double parity checks – Hamming codes – Linear block codes – Cyclic codes – Syndrome calculation – Block encoders and Decoders	Classroom teaching ICT tools and Google classroom
Unit – III	Variable-Length Codes – Huffman Codes Unique decoding – Instantaneous codes and its construction – The Kraft's inequality – Shortened block codes – The McMillan's Inequality – Huffman codes and its special cases – Extensions of a code – Huffman codes Radix r – Noise in Huffman coding probabilities – Use of Huffman codes – Hamming Huffman coding.	Classroom teaching ICT tools and Google classroom
Unit – IV	Entropy and Shannon's First Theorem Entropy and its Mathematical properties – Entropy and coding – Shannon-Fano coding – Entropy of a Markov process – The Adjoint system – Robustness of Entropy.	Classroom teaching ICT tools and Google classroom
Unit - V	Mutual Information, Channel Capacity & Shannon's Main Theorem Information channel – Capacity of a Binary symmetric channel – System entropies – Mutual information – Definition of channel capacity – Uniform channel – Conditional mutual information – Random encoding - Average random code – Fano bound – Converse of Shannon's theorem.	Classroom teaching ICT tools and Google classroom

Course outcome:

After completion of this course student will be able to analyze the process of coding for analog and discrete sources and the mathematical model for information sources. Solve problems on error detection and error correction for various types of codes. Understand the principles of Huffman codes and to solve problems therein. Learn the concepts of mutual information, channel capacity, and Shannon's Main Theorem.

Reference Books

- Error Control Coding Lin and Costello Pearson Education

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• Principles of Digital Communication Das, Mullick and Chatterjee New Age International Publishers
• Information Theory, Coding and Cryptography Ranjan Bose TMH

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to gain in depth knowledge about error detection & correction codes and entropy	Goal04(quality education) Goal09(Industry,Innovation and Infrastructure)	

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SEMESTER- 7th
Course: BE ECE
SUBJECT: Nano Technology

Subject Code:3TBEC701
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To introduce and provide a broad view of the nascent field of nanotechnology to Undergraduates.
- To introduce students to inter- and multi-disciplinary science and engineering.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Limitations of CMOS Fundamentals of MOSFET devices - Scaling of CMOS – Limitations – Alternative concepts in materials – Structures of MOS devices: SOI MOSFET, FINFETS, Dual Gate MOSFET, Ferro electric FETs.	Classroom teaching ICT tools and Google classroom
Unit – II	Micro and Nano Fabrication Optical Lithography – Electron beam Lithography – Atomic Lithography – Molecular beam epitaxy - Nano lithography.	Classroom teaching ICT tools and Google classroom
Unit – III	Characterization Equipments Principles of Electron Microscopes – Scanning Electron Microscope – Transmission Electron Microscope - Atomic Force Microscope – Scanning Tunneling Microscope.	Classroom teaching ICT tools and Google classroom
Unit – IV	Nano Devices – I Resonant tunneling diodes – Single electron devices – Josephson junction – Single Flux Quantum logic – Molecular electronics.	Classroom teaching ICT tools and Google classroom
Unit - V	Nano Devices – II (Quantum computing: principles – Qbits – Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, Spin FETs, MRAM.	Classroom teaching ICT tools and Google classroom

Course outcome:

After completion of this course student will be able to familiar with the important concepts applicable to small electronic devices, their fabrication, characterization and application.

Reference Books

- Nano electronics and information technology Rainer Waser (Ed.), Wiley- VCH. 3rd Edition, 2012
- A Microscopic Electronics in Solid State Nanostructure Thomas Heinzel Wiley- VCH, 2008
- Nanotechnology – (Basic Science and Emerging Technologies) Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse Overseas Press, 2002

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to get the concepts of lithography and characterization of equipments	Goal04(quality education)	

HOD (ECE DEPT.)
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SEMESTER- 7th **Subject Code:3TBEC702**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Optical Communication **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes.
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
- To learn the fiber optical network components, variety of networking aspects, FDDI, SONET/SDH and operational principles WDM.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Overview of Optical Fiber Communications (OFC): Motivation, optical spectral bands, key elements of optical fiber systems. Optical fibers: basic optical laws and definitions, optical fiber modes and configurations, mode theory for circular waveguides, single mode fibers, graded-index fiber structure, fiber materials, photonic crystal fibers, fiber fabrication, fiber optic cables.	Classroom teaching ICT tools and Google classroom
Unit – II	Optical sources: Light emitting diodes (LED): structures, materials, quantum efficiency, LED power, modulation of an LED. Laser diodes: modes, threshold conditions, laser diode rate equations, external quantum efficiency, resonant frequencies, structure and radiation patterns, single mode lasers, modulation of laser diodes. Power launching and coupling: source to fiber power launching, fiber to fiber joints, LED coupling to single mode fibers, fiber splicing, optical fiber connectors.	Classroom teaching ICT tools and Google classroom
Unit – III	Photo detectors: pin photo detector, avalanche photodiodes, photo detector noise, detector response time, avalanche multiplication noise. Signal degradation in optical fibers: Attenuation: units, absorption, scattering losses, bending losses, core and cladding losses. Signal distortion in fibers: overview of distortion origins, modal delay, factors contributing to delay, group delay, material dispersion, waveguide dispersion, polarization-mode dispersion. Characteristics of single mode fibers: refractive index profiles, cutoff wavelength, dispersion calculations, mode field diameter, bending loss calculation. Specialty fibers.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Optical receivers: fundamental receiver operation, digital receiver performance, eye diagrams, coherent detection: homodyne and heterodyne, burst mode receiver, analog receivers. Digital links: point to point links, link power budget, rise time budget, power penalties. Analog links: overview of analog links, carrier to noise ratio, multi channel transmission techniques.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Optical technologies Wavelength division multiplexing (WDM) concepts: operational principles of WDM, passive optical star coupler, isolators, circulators, active optical components: MEMS technology, variable optical attenuators, tunable optical filters, dynamic gain equalizers, polarization controller, chromatic dispersion compensators. Optical amplifiers: basic applications and types of optical amplifiers, Erbium Doped Fiber Amplifiers (EDFA): mechanism, architecture, power conversion efficiency and gain. Amplifier noise, optical SNR, system applications. Performance Measurement and monitoring: measurement standards, basic test equipment, optical power	Classroom teaching, ICT Based and individual presentation and Google classroom

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	measurements, optical fiber characterization, eye diagram tests, optical time-domain reflectometer, optical performance monitoring.	

List of Experiments:

- Launching of light into the optical fiber and calculate the numerical apertureand V-number.
- Observing Holograms and their study.
- Measurement of attenuation loss in an optical fiber.
- Diffraction using gratings.
- Construction of Michelson interferometer.
- Setting up a fiber optic analog link and study of PAM.
- Setting up a fiber optic digital link and study of TDM and Manchester coding.
- Measurement of various misalignment losses in an optical fiber.

Course outcome:

Students are able to

- Recognize and classify the structures of Optical fiber and types.
- Discuss the channel impairments like losses and dispersion
- Analyze various coupling losses.
- Classify the Optical sources and detectors and to discuss their principle.
- Familiar with Design considerations of fiber optic systems.
- To perform characteristics of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyze the results to provide valid conclusions.

Reference Books

- Optical Fiber Communications Keiser TMH
- Optical Fiber Communication- Principles and Practices Senior Pearson Education
- Fiber Optic Communication Systems Agarwal Wiley India

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Fiber Optics Engineer	Able to understand the concepts of Light detector and optical recievers.	Goal04(quality education) Goal09(Industry, Innovation and Infrastructure)	

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SEMESTER- 7th **Subject Code:3TBEC703**
Course: BE ECE **Theory Max. Marks:**
SUBJECT: Microwave Engineering **Theory Min. Marks**

COURSE OBJECTIVE:

- To understand and gain complete knowledge about Microwave devices such as amplifiers, oscillators.
- To understand and gain complete knowledge about microwave components
- To understand and gain complete knowledge about microwave measurements.
- To understand and gain complete knowledge about RF basic concepts, RF filters design.
- To understand and gain complete knowledge about RF amplifier design.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Microwave Transmission System General representation of EM field in terms of TEM, TE and TM components, Uniform guide structures, rectangular wave guides, Circular Wave guides, Solution in terms of various modes, Properties of propagating and evanescent modes, Dominant modes, Normalized model voltages and currents, Power flow and energy storage in modes frequency range of operation for single mode working, effect of higher order modes, Strip line and micro strip lines general properties, Comparison of coaxial, Micro strip and rectangular wave guides in terms of band width, power handling capacity, economical consideration etc.	Classroom teaching ICT tools and Google classroom
Unit – II	Microwave Networks and Component Transmission line ports of microwave network, Scattering matrix, Properties of scattering matrix of reciprocal, Non reciprocal, loss less, Passive networks, Examples of two, three and four port networks, wave guide components like attenuator, Phase shifters and couplers, Flanges, Bends, Irises, Posts, Loads, Principle of operation and properties of E-plane, H-plane Tee junctions of wave guides, Hybrid T, Multi-hole directional coupler, Directional couplers, Microwave resonators- rectangular. Excitation of wave guide and resonators by couplers. Principles of operation of non reciprocal devices, properties of ferrites, Isolators and phase shifters.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Microwave Solid State Devices and Application PIN diodes, Properties and applications, Microwave detector diodes, detection characteristics, Varactor diodes, parametric amplifier fundamentals, Manley-Rowe power relation MASER, LASER , Amplifiers, Frequency converters and harmonic generators using varactor diodes, Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Microwave Vacuum Tube Devices Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavity and Reflex Klystrons, arrival time curve and oscillation conditions in reflex klystrons, mode- frequency characteristics. Effect of repeller voltage variation on power and frequency of output. Principle of working of magnetrons. Electron dynamics in planar and cylindrical magnetrons, Cutoff magnetic field, Resonant cavities in magnetron, n-mode operation Mode separation techniques, Rising sun cavity and strapping. Principle of working of TWT amplifier. Slow wave structures, Approximate gain relationship in forward wave TWT.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Microwave Measurements Square law detection, Broadband and tuned detectors. Wave-guide probes, Probe and detector mounts, Slotted line arrangement and VSWR meter, Measurement of wave-guide impedance at load port by slotted line, Microwave bench components and source modulation. Measurement of scattering matrix parameters, High, Medium and low-level power measurement techniques, Characteristics of bolometers, bolometer mounts, Power measurement bridges, Microwave frequency measurement techniques, calibrated	Classroom teaching, ICT Based and individual presentation and Google classroom

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	resonators (transmission and absorption type). Network Analyzer and its use in measurements.	

List of Experiments:

Following illustrative practical should be simulated with the help of any RF simulation software:-

- Study the characteristics of Klystron Tube and to determine its electronic tuning range.
- To determine the frequency and wavelength in a rectangular wave-guide working on TE10 mode.
- To determine the Standing Wave-Ratio and reflection coefficient.
- To measure an unknown impedance with Smith Chart.
- To study the V-I characteristics of Gunn Diode.
- To study the following characteristics of Gunn Diode.
  - (a) Output power and frequency as a function of voltage.
  - (b) Square wave modulation through PIN diode.
- Study the function of Magic Tee by measuring the following parameters.
  - (a) Measurement of VSWR at different ports and
  - (b) Measurement of isolation and coupling coefficient.
- Study the function of Isolator/Circulator by measuring the following parameters.
  - (a) Input VSWR measurement of Isolator / Circulator.
  - (b) Measurement of insertion loss and isolation.
- Study the function of Attenuator (Fixed and Variable type) by measuring the following parameters.
  - (a) Input VSWR measurement.
  - (b) Measurement of insertion loss and attenuation.
- Study the function of Multi Hole Directional Coupler by measuring the following parameters.
  - (a) To measure main line and auxiliary line VSWR.
  - (b) To measure the coupling factor and directivity. • Study of a network analyzer and measurements using it.

Course outcome:

- Gain knowledge and understanding of microwave analysis methods.
- Be able to apply analysis methods to determine circuit properties of passive/active microwave devices.
- Know how to model and determine the performance characteristics of a microwave circuit or system using computer aided design methods.
- Have knowledge of basic communication link design; signal power budget, noise evaluation and link carrier to noise ratio.
- Have knowledge of how transmission and waveguide structures and how they are used as elements in impedance matching and filter circuits.

Reference Books

- Microwave Devices and Circuits Liao Pearson Education
- Microwave Engineering Das TMH
- Microwave Engineering Rao PHI Learning
- Microwave Semiconductor Devices Roy and Mitra PHI learning

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Microwave Engineer and Broadcast Engineer in Telecomm and TV Broadcasting Industries.	Understand the working of Microwave Tubes and application of microwave solid state devices.	Goal04(quality education)	

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SEMESTER- 7th **Subject Code:3TBEC704**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Digital Image Processing **Theory Min. Marks**:17

COURSE OBJECTIVE:

- The fundamentals of digital image processing.
- Image transform used in digital image processing.
- Image enhancement techniques used in digital image processing.
- Image restoration techniques and methods used in digital image processing.
- Image compression and Segmentation used in digital image processing.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Digital Image Processing (DIP) Introduction, examples of fields that use DIP, fundamental steps in DIP, components of an image processing system. Digital Image Fundamentals: elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.	Classroom teaching ICT tools and Google classroom,
Unit – II	Image Transforms Two-dimensional (2D) impulse and its shifting properties, 2D continuous Fourier Transform pair, 2D sampling and sampling theorem, 2D Discrete Fourier Transform (DFT), properties of 2D DFT. Other transforms and their properties: Cosine transform, Sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform, KL transform.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Image Enhancement Spatial domain methods: basic intensity transformation functions, fundamentals of spatial filtering, smoothing spatial filters (linear and non-linear), sharpening spatial filters (unsharp masking and high boost filters), combined spatial enhancement method. Frequency domain methods: basics of filtering in frequency domain, image smoothing filters (Butterworth and Gaussian low pass filters), image sharpening filters (Butterworth and Gaussian high pass filters), selective filtering.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Image Restoration Image degradation/restoration, noise models, restoration by spatial filtering, noise reduction by frequency domain filtering, linear position invariant degradations, estimation of degradation function, inverse filtering, Wiener filtering, image reconstruction from projection.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Image Compression Fundamentals of data compression: basic compression methods: Huffman coding, Golomb coding, LZW coding, Run-Length coding, Symbol based coding. Digital image watermarking, representation and description- minimum perimeter polygons algorithm (MPP).	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

As per suggested by the course coordinator.

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Course outcome:

• An ability to apply knowledge of mathematics, science, and engineering
• An ability to design and conduct experiments, as well as to analyze and interpret data
• An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
• An ability to function on multidisciplinary teams e. an ability to identify, formulate, and solve engineering problems
• An understanding of professional and ethical responsibility
• An ability to communicate effectively
• The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
• A recognition of the need for, and an ability to engage in life-long learning j
• A knowledge of contemporary issues
• An ability to use the techniques, skills, and modern engineering tools necessary for eng neering practice.

Reference Books

• Digital Image Processing Gonzalez and Woods Pearson Education
• Fundamentals of Digital Image Processing Anil Jain PHI Learning
• Digital Image Processing William K. Pratt Wiley India As per suggested by the course coordinator.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to understand the concepts of Hadamand transform, haar transform and image compression	GOAL-04(quality education)	

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SEMESTER- 7th
Course: BE ECE
SUBJECT: Satellite Communication

Subject Code:3TBEC705
Theory Max. Marks:50
Theory Min. Marks17

COURSE OBJECTIVE:

- To make the students understand the basic concept in the field of Satellite Communication and to know how to place a satellite in an orbit.
- To calculate the link power budget.
- To get a complete knowledge about the earth and space subsystems.
- To gain knowledge about the Satellite Access schemes.
- To gain knowledge about the Satellite system and mobile services provided.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Overview of satellite systems: Introduction, Frequency allocations for satellite systems. Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	The Geostationary orbit: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits. Polarization: antenna polarization, polarization of satellite signals, cross polarization discrimination. Depolarization: ionospheric, rain, ice.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	The Space segment: introduction, power supply, attitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem, Morelos and Satmex 5, Anik-satellites, Advanced Tiros-N spacecraft. The Earth segment: introduction, receive-only home TV systems, master antenna TV system, Community antenna TV system, transmit-receive earth station.	Classroom teaching ICT tools and Google classroom,
Unit – IV	The space link: Introduction, Equivalent isotropic radiated power (EIPR), transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, inter-satellite links. Interference between satellite circuits.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Satellite services VSAT (very small aperture terminal) systems: overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network. Direct broadcast satellite (DBS) Television and radio: digital DBS TV, BDS TV system design and link budget, error control in digital DBS-TV, installation of DBS-TV antennas, satellite radio broadcasting.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

The students will be:

- Able to learn the dynamics of the satellite.
- Able to understand the communication satellite design.
- Able to understand how analog and digital technologies are used for satellite communication networks.
- Able to learn the design of satellite links.
- Able to study the design of Earth station and tracking of the satellites.

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Reference Books

- Satellite Communications Roddy TMH
- Satellite Communications Timothy Pratt Wiley India
- Satellite Communication Systems Engineering Pritchard, Suyderhoud and Nelson Pearson Education

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Get the knowledge about Geo synchronous orbit and satellite link design.	Goal04(quality education) Goal09(Industry, Innovation and Infrastructure)	

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SEMESTER- 7th
Course: BE ECE
SUBJECT: Minor Project & Seminar

Subject Code:3TBEC706
Theory Max. Marks:25
Theory Min. Marks:12

COURSE OBJECTIVE:

Mathematics fundamental necessary to formulate, solve and analyze engineering problems.

Syllabus:

The student should select a topic (from the subjects he has studied so far or any topic related to real life problem). He should do the literature survey, analyze the problem and propose some solution for the same. He should prepare a detailed (typed) report regarding the topic and should present the same with the help of power point presentation at the end of the semester. The analysis of the problem may be done with the help of some software or any hardware (which may be made by the student.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Understand and analyze the engineering related problems	Goal04(quality education)	

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SEMESTER- 7th **Subject Code:3TBEC707**
Course: BE ECE **Theory Max. Marks:25**
SUBJECT: Industrial Training/Entrepreneurship Workshop /IPR **Theory Min. Marks**:12

Duration: 4 weeks after the VI semester in the summer break. Assessment in VII semester.

SCHEME OF EXAMINATION

For the assessment of industrial training undertaken by the students, following components are considered with respective weight age.

A) Term work In Industry Marks allotted

1. Attendance and General Discipline	05
2. Daily diary Maintenance	05
3. Initiative and Participative attitude during training	05
4. Assessment of training by Industrial Supervisor/s	10
Total	**25**

(B) Practical/Oral Examination (Viva-voce In Institution Marks allotted

1. Training Report	15
2. Seminar and cross questioning (defense)	10
Total	**25**

Marks of various components in industry should be awarded to the student, in consultation with the Training and Placement Officer (TPO)/ Faculty of the institute, who must establish contact with the supervisor/ authorities of the organization where, students have taken training, to award the marks for term work. During training, students will prepare a first draft of the training report in consultation with the section incharge. After training they will prepare final draft with the help of the TPO/ faculty of the institute. Then, they will present a seminar on their training and will face viva-versa on training in the institute.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Get the training from the industry	Goal04(quality education)	

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SEMESTER- 8th **Subject Code:3TBEC801**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: ADHOC & SENSOR NETWORKS **Theory Min. Marks**:17

COURSE OBJECTIVE:

This course deals with the comprehensive knowledge of various techniques in mobile networks/Adhoc networks and sensor based networks. The objective of this course is to facilitate the understanding of Infrastructure less networks and their importance in the future directions for wireless communications.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.	Classroom teaching ICT tools and Google classroom,
Unit – II	Mac Protocols for Ad Hoc Wireless Networks Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Routing Protocols and Transport Layer in Ad Hoc Wireless Networks Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Wireless Sensor Networks (WSNS) and Mac Protocols Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	WSN Routing, Localization & QoS Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design- Synchronization-Transport Layer issues	Classroom teaching ICT tools and Google classroom,

Course Outcome:

Upon completion of the course, the student should be able to: Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks. Analyze the protocol design issues of ad hoc and sensor networks. Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues. Evaluate the QoS related performance measurements of ad hoc and sensor networks.

Text Books:

- Ad Hoc Wireless Networks: Architectures and Protocols C. Siva Ram Murthy, and B. S. Manoj Prentice Hall Professional Technical Reference, 2008

Reference Books

• Ad Hoc & Sensor Networks: Theory and Applications Carlos De Morais Cordeiro, Dharma Prakash Agrawal World

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Scientific Publishing Company, 2006
• Wireless Sensor Networks Feng Zhao and Leonides Guibas Elsevier Publication - 2002
• Protocols and Architectures for Wireless Sensor Networks Holger Karl and Andreas Willig Wiley, 2005

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Network Engineer	Able to get the knowledge of network router protocol and transport layer		

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SEMESTER- 8th **Subject Code:3TBEC801**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Principle of Biomedical Instrumentation **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To understand the Origin of Bioelectric potential and their measurements using appropriate electrodes and Transducers.
- To understand how to measure various biochemical and nonelectrical parameters of human system.
- To understand the Electro-physiology of various systems and recording of the bioelectric signals.
- To understand the working principles of various Imaging techniques.
- To understand the design aspects of various Assist and Therapeutic Devices.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Biopotential Electrodes and Transducers Electrode theory- Electrode electrolyte interface, half-cell potential, Hydrogen, Calomel, Ag-AgCl electrode, needle and wire electrode, surface electrodes, microelectrode-metal micropipette. Physiological Transducers: Resistive transducers - Thermistor, Inductive Transducers - Capacitive Transducers - Photoelectric Transducers -Piezoelectric Transducers -, Biochemical Transducers- pH, pCo2 and pO2 electrodes.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Bio Electric Potentials and Electro Physiological Measurements Sources of Bioelectric potentials - Resting and Action potential - Propagation of Action potential Electrophysiology of Heart, Nervous System and Muscle Activity Bio-signals: ECG - EEG, Evoked potential – EMG- ERG- Electrodes and Lead System, Typical waveforms and Signal characteristics Signal Conditioning circuits: Design of low Noise Medical Amplifier, Isolation Amplifier, Protection Circuits and Electrical Safety.	Classroom teaching ICT tools and Google classroom,
Unit – III	Non-Electrical Parameter Measurements Measurement of Blood Pressure, Blood Flow, Plethysmography, Cardiac Output, Heart Sounds- Lung Volumes and their measurements- Auto analyzer – Blood cell counters, Oxygen saturation of Blood.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Medical Imaging Techniques X-ray machine – Computer Tomography – Angiography – Ultrasonography – Magnetic Resonance Imaging System – Nuclear Imaging Techniques – Thermography – Lasers in Medicine – Endoscopy.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Telemetry, Assist and Therapeutic Devices Bio telemetry – Elements and Design of Bio telemetry system. Assist and Therapeutic devices: Cardiac Pacemakers – Defibrillators – Artificial Heart Valves – Artificial Heart Lung machine – Artificial Kidney – Orthopadeic Prosthetics – Respiratory therapy equipment – Patient Monitoring System.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

After completion of this course student will understand the Origin of Bioelectric potential and their measurements using appropriate electrodes and Transducers, how to measure various biochemical and nonelectrical parameters of human system, Electro-physiology of various systems and recording of the bioelectric signals.
They also understand the working principles of various Imaging techniques and the design aspects of various Assist and Therapeutic Devices.

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Reference Books

• Biomedical Instrumentation and Measurements Leslie Cromwell, Fred J. Weibell and Erich A. Pfeifer 2nd Edition, PHI, 2006
• Handbook of Biomedical Instrumentation Khandpur. R. S 2nd edition, 12th reprint, Tata McGraw Hill, 2008
• Introduction to Biiomedical Equipment Technology Joseph J. Carr and John M. Brown 4th edition, Pearson Education, 2008.
• Medical Instrumentation Application and Design John G. Webster 3rd edition, Wiley India, 2008

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Bio Medical Engineer and X- Ray Technician	Able to get the knowledge of biomedical signals and different types of instruments.	Goal04(quality education)	Biomedical Instruments Service provider

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SEMESTER- 8th **Subject Code:3TBEC801**
Course: BE ECE **Theory Max. Marks:50**
SUBJECT: Communication Switching Techniques **Theory Min. Marks**:17

COURSE OBJECTIVE:

To study the concepts of message switching, circuit switching, stronger switching, crossbar switching, electronic switching, and digital switching. To understand the problems of congestion, queuing, and to study methods like Grade of Service, and Blocking Probability to provide an estimate of the amount of traffic present in various systems. To solve problems in single-stage networks, strict-sense non-blocking networks, and sectionalized switching networks. To study concepts like Reliability, Availability, and Security in various types of switching systems. To learn the different kinds of signaling, circuit and packet switching techniques.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Basic Switching Systems for Telecommunication Crossbar switching – Electronic space division switching – Time division switching – Time multiplexed switching – n stage combination switching - hybrid time and space division multiplexes.	Classroom teaching ICT tools and Google classroom,
Unit – II	Traffic Engineering Congestion – Network traffic load and Parameters – Traffic measurement – Lost-call system – Grade of Service and Blocking probability – Modeling switching systems – Incoming traffic and service time characterization – Blocking models and loss estimates – Queuing systems – Simulation models.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Switching Networks Single-stage networks – Gradings – Link systems – Grades of service of link systems – Application of graph theory to link systems – Use of expansion – Call packing – Rearrangeable networks – Strict-sense non-blocking networks – Sectionalized switching networks.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Time-Division Switching and Control of Switching Systems Space and time switching – Time-division switching networks – Grades of service of time-division switching networks – Non-blocking networks – Synchronization – Call-processing functions – Common control – Reliability, availability and security – Stored program control.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Signaling and Packet Switching Customer line signaling – FDM carrier systems – PCM signaling – Inter-register signaling – Common-channel signaling principles – CCITT signaling – Digital customer line signaling – Statistical multiplexing – Local area and wide area networks – Large scale and Broadband networks.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

After completion of this course student will understand the concepts of message switching, circuit switching, strowger switching, crossbar switching, electronic switching, and digital switching. They also understand the problems of congestion, queuing, and to study methods like Grade of Service, and Blocking Probability to provide an estimate of the amount of traffic present in various systems. problems in single-stage networks, strict-sense non-blocking networks, and sectionalized switching networks. They also understand the concepts like Reliability, Availability, and Security in various types of switching systems.

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Reference Books

- Telecommunications Switching, Traffic and Networks Flood. J. E Pearson Education Ltd., 1999
- Telecommunication Switching Systems and Networks Thiagarajan Viswanathan Prentice Hall of India Pvt. Ltd, 1992

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to understand the concept of switching network	Goal04(quality education)	

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SEMESTER- 8th
Course: BE ECE
SUBJECT: Computer Networks

Subject Code:3TBEC802
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

To develop an understanding of modern network architectures from a design and performance perspective. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs). To clarify network terminology. To provide an opportunity to do network programming using TCP/IP. To give the students experience working in programming teams. To provide a WLAN measurement experience. To expose students to emerging technologies and their potential impact.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Computer Networks Introduction, applications, types of networks, network software, reference models- OSI model, TCP/IP model, comparison of OSI and TCP/IP models, example networks. The Physical layer Design Issues, review of data communication concepts (configuration, topology, transmission mode, media- guided and unguided, types of switching etc).	Classroom teaching ICT tools and Google classroom,
Unit – II	The Data Link layer Design issues, error detection and correction, data link protocols- stop and wait and sliding window ARQ, utilization of ARQ techniques, example of data link protocol- HDLC. The Medium Access Control Layer Static and dynamic channel allocation, multiple access protocols- Pure and slotted ALOHA, CSMA, Collision free protocols, limited contention protocols, CSMA/CD (ETHERNET), fast Ethernet, Gigabit Ethernet.	Classroom teaching ICT tools and Google classroom,
Unit – III	Wireless Protocols The 802.11, the 802.16, Bluetooth, RFID, Data link layer switching- uses of repeaters, hubs, bridges, switches, routers and gateways. The Network Layer Design Issues, Virtual Circuit and datagram networks, routing algorithms- adaptive and non-adaptive algorithms, congestion control algorithms, quality of service, internetworking, Network layer in the Internet- IPv4 protocol, IP addresses, IPv6 protocol, Internet control protocols, Mobile IP.	Classroom teaching ICT tools and Google classroom,
Unit – IV	The Transport Layer Design issues and services, Transport protocols, congestion control, UDP and TCP protocols, performance issues.	Classroom teaching ICT tools and Google classroom,
Unit - V	The Application Layer The Domain Name System, E-mail, World Wide Web, streaming audio and video, content delivery.	Classroom teaching ICT tools and Google classroom,

List of Experiments:

As per suggested by the course coordinator and Practical should be performed using Scilab/ MATLAB simulation software based on the above contents.

Course outcome:

After completing this course the student must demonstrate the knowledge and ability to:

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• Independently understand basic computer network technology.
• Understand and explain Data Communications System and its components.
• Identify the different types of network topologies and protocols.
• Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
• Identify the different types of network devices and their functions within a network
• Understand and building the skills of sub netting and routing mechanisms.
• Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Reference Books

• Computer Networks Tanenbaum Pearson Education
• Computer Networks Forouzan TMH
• Computer Networking and Internet Protocol Stallings Pearson Education
• Data Communication and Networking Forouzan Forouzan

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Computer Hardware Engineer	Able to understand the concept of OSI model, IEEE standard and high speed network	Goal04(quality education)	

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SEMESTER- 8th
Course: BE ECE
SUBJECT: TV & RADAR ENGINEERING

Subject Code:3TBEC803
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture tubes and Television Camera Tubes.
- To study the various Color Television systems with a greater emphasis on television standards.
- To study the advanced topics in digital television and High-definition television.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Basic Television System Introduction: Scanning principles: sound and picture transmission, scanning process, camera pick-up devices, video signal, transmission and reception of video signals, brightness perception and photometric quantities, aspect ratio and rectangular scanning, persistence of vision and flicker, vertical resolution, the Kell factor, horizontal resolution and video bandwidth, interlaced scanning.Composite Video Signal: Lines and scanning, video signal components, horizontal sync and blanking standards, vertical sync and blanking standards, video modulation and vestigial side band signal, sound modulation and inter-carrier system.Television Standards: Standard channel characteristics, reception of the vestigial side band signals, television broadcast channel, consolidated CCIR system-B standard, various television broadcast systems.Television Pick-up devices and Cameras: Camera lenses, auto-focus systems, television camera pick-ups, Silicon Vidicon, CCD image sensors, video processing of camera pick-up signal.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Colour Television Colour fundamentals: mixing of colours and colour perception, chromaticity diagram, colour television camera, colour TV signals and transmission, NTSC, SECAM and PAL system, Trinitron picture tube, automatic degaussing, plasma, LCD displays.Television transmission and reception: requirement of TV broadcast transmission, design principle of TV transmitters, IF modulation, power output stages, block diagram of TV transmitter, co-channel interference and ghost images during propagation of television signals, antenna requirements for television system, block schematic and function requirements for television receivers, trends in circuit design, colour television receiver.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Digital Television Technology Merits of digital technology, fully digital television system, digital television signals, digitized video parameters, digital video hardware, transmission of digital TV signals, bit rate reduction, digital TV receivers, video processor unit, audio processor unit. Other television systems: Closed Circuit television system (CCTV), Cable television system (CATV), multiplexed analog component encoding television system (MAC TV), High definition television system (HDTV), High definition multiplexed analog component television (HD-MAC TV), High Performance Computer Controlled TV (HPCC TV), 3-D stereoscopic television techniques..	Classroom teaching ICT tools and Google classroom,
Unit – IV	The Radar range equation, block diagram and operation, performance factors: prediction of range performance, minimum detectable signal, receiver noise, probability density functions, signal to noise ratios. Radar cross section of targets, transmitter power, pulse repetition frequency and range ambiguities, antenna parameters. The CW radar: the Doppler effect, FM-CW radar. The Moving Target Indicator (MTI) Radar: delay line cancellers.	Classroom teaching, ICT Based and individual presentation and Google classroom

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Unit - V	Radar Receivers The radar receiver, noise figure, mixers, low noise front ends, displays- type A and PPI representations, duplexer and receiver protectors. Other Radar systems: Synthetic aperture radar, HF over the horizon radar, Air Surveillance Radar (ASR), Bistatic radar.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

Section A: Television Engineering

1.
(a) To Study the Circuit Description of RF Tuner Section.
(b) To Study the RF Section by Measuring Voltages at Various Test Points.
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for RF Section.
2.
(a) To Study the Circuit Description of VIF Tuner Section.
(b) To Study the VIF Section by Measuring Voltages at Various Test Points.
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for VIF Section.
3.
(a) To Study the Circuit Description of Video and Chroma Section Tuner Section.
(b) To Study the Video and Chroma Section by Measuring Voltages at Various Test Points.
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for video and Chrome Section.
4.
(a) To Observe the Horizontal Oscillator and Horizontal Output Section through Various Test Point.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Horizontal Oscillator and Horizontal Output Section.
5.
(a) To Observe the Vertical Oscillator and Vertical Output Section through Various Test Point.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Vertical Oscillator and Vertical Output Section.
6. To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Sound Output Section.
7. To Study the Circuit Description of Audio and Video Section Tuner Section.
(a) To Study the System Control Section by Measuring Voltages at Various Test Points.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for System Control Section.

Section B: RADAR

1. Study of Doppler Effect.
2. To Measure Speed of a fan and various Other Objects (Pendulum, Tuning Fork, Plate
3. To Simulate the Variable Speed of Moving Objects using Velocity Simulator.

Course Code: 3TBEC- 803

Course outcome:

The learners will be able to understand the transmission of video signals and importance of television standards to effectively work with broadcasting applications. Also he acquires sound knowledge of latest topics in digital video transmission.

Reference Books

- Television and Video Engineering Dhake Dhake
- Introduction to Radar Systems Skolnik TMH, New Delhi
- Television Engineering and Video Systems Stallings TMH, New Delhi.
- Monochrome and Colour Television Gulati New Age International

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Surveillance Engineer and Air Traffic Controller in AAI And Milatry Services.	Able to gain in depth knowledge about the digital television technology	Goal04(quality education) Goal09(Industry ,Innovation and Infrastructure)	Television Service Provider

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SEMESTER- 8th **Subject Code:3TBEC804**
Course: BE ECE **Theory Max. Marks:**
SUBJECT: Principles of Management and Managerial Economics **Theory Min. Marks**

COURSE OBJECTIVE:

The purpose of this course is to expose the student to the basic concepts of management in order to aid the student in understanding how an organization functions, and in understanding the complexity and wide variety of issues managers face in today's business firms. This is an introductory level management course that deals with the basic tenets of organization and management theory and practice. The course attempts to familiarize the student with the various functions, processes, and activities of management and to help the student appreciate the underlying theories that constitute the discipline of management. The is not intended to turn students into managers but it is expected that students successfully completing this course will be knowledgeable as to the historical, current, and future issues in management.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Management Concept: Management, Administration and Organization Difference and Relationship between Organization Management and Administration. Importance of Management, Characteristics of Management.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Management: Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management, Project Management.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Decision Making: Introduction and Definition, Types of Decisions, Techniques of Decision Making, Decision making under certainty Decision making under uncertainty, Decision Making under risk.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Managerial Economics: Introduction, Factors Influencing Manager, Micro and Macro-economics, Theory of the Cost, Theory of the Firm, Theory of Production Function.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Productivity: Input-Output Analysis, Micro-economics Applied to Plants and Industrial Undertakings, Production and Production system, Productivity, Factors affecting Productivity, Increasing Productivity of Resources.	Classroom teaching, ICT Based and individual presentation and Google classroom

COURSE OUTCOME:

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

- Understand the roles of managers in firms
- Understand the internal and external decisions to be made by managers
- Analyze the demand and supply conditions and assess the position of a company
- Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.
- Analyze real-world business problems with a systematic theoretical framework.
- Make optimal business decisions by integrating the concepts of economics, mathematics and statistics.

Reference Books

- Essentials of Management Koontz PHI Learning
- Principle and Practice of Management T. N. Chhabra Dhanpat Rai, New Delhi
- Managerial Economics Joel Dean PHI learning

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• Industrial Engineering and Management O.P. Khanna Dhanpat Rai

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Management Trainee	Able to understand organization, planning and management techniques.	Goal04(quality education)	Social Enterpreneur

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SEMESTER- 8th **Subject Code:3TBEC804**
Course: BE ECE **Theory Max. Marks:**
SUBJECT: Soft Computing **Theory Min. Marks**

COURSE OBJECTIVE:

To give knowledge of soft computing theories fundamentals, i.e. of fundamentals of non-traditional technologies and approaches to solving hard real-world problems, namely of fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Soft Computing Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies.Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.	Classroom teaching ICT tools and Google classroom,
Unit – II	Neural Network : Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebbs learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA,	Classroom teaching ICT tools and Google classroom,
Unit – III	Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine . Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Fuzzy Logic ,Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.	Classroom teaching ICT tools and Google classroom,
Unit - V	Genetic algorithm, Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

Students acquire knowledge of soft computing theories fundamentals and so they will be able to design program systems using approaches of these theories for solving various real-world problems. Students awake the importance of tolerance of imprecision and uncertainty for design of robust and low-cost intelligent machines.

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Reference Books

• Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications S, Rajasekaran & G.A. Vijayalakshmi Pai
PHI Publication
• Principles of Soft Computing S. N. Sivanandam & S.N. Deepa Wiley Publications
• Neural Network fundamental with Graph , Algo.& Appl Bose TMH

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
In the Field of Research	Able to understand the concept of ANN and fuzzy logic	Goal04(quality education)	

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SEMESTER- 8th
Course: BE ECE
SUBJECT: Web Engineering

Subject Code:3TBEC804
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

The Objective of the course are as follows:

- To be able to analyze and design comprehensive systems for the creation, dissemination, storage, retrieval, and use of electronic records and documents
- To learn and use some of the client-side and server-side languages used to manipulate information on the World Wide Web – i.e. ASP.NET, and Javascript.
- To learn techniques and evaluation metrics for ensuring the proper operability, maintenance and security of a web application.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Web Engineering: Introduction, History, Evolution and Need, Time line, Motivation, Categories & Characteristics of Web Applications, Web Engineering Models, Software Engineering v/s Web Engineering. World Wide Web: Introduction to TCP/IP and WAP, DNS, Email, TelNet, HTTP and FTP. Browser and search engines: Introduction, Search fundamentals, Search strategies, Directories search engines and Meta search engines, Working of the search engines. Web Servers: Introduction, Features, caching, case study-IIS, Apache.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Information Architecture: Role, Collaboration and Communication, Organizing Information, Organizational Challenges, Organizing Web sites parameters and Intranets Website Design: Development, Development phases, Design issues, Conceptual Design, High-Level Design, Indexing the Right Stuff, Grouping Content. Architectural Page Mockups, Design Sketches, Navigation Systems. Searching Systems, Good & bad web design, Process of Web Publishing. Web-site enhancement, submission of website to search engines. Web security: issues, security audit. Web effort estimation, Productivity Measurement, Quality usability and reliability. Requirements Engineering for Web Applications: Introduction, Fundamentals, Requirement Source, Type, ,Notations Tools. Principles Requirements Engineering Activities, Adapting RE Methods to Web Application.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Technologies for Web Applications: HTML and DHTML: Introduction, Structure of documents, Elements, Linking, Anchor Attributes, Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text, Fonts, Tables, Frames and layers, Audio and Video Support with HTML Database integration, CSS, Positioning with Style sheets, Forms Control, Form Elements. Introduction to CGI, PERL, JAVA SCRIPT, JSP, PHP, ASP & AJAX. Cookies: Creating and Reading	Classroom teaching ICT tools and Google classroom,
Unit – IV	Technologies for Web Applications II: XML: Introduction, HTML Vs XML, Validation of documents, DTD, Ways to use, XML for data files, Embedding XML into HTML documents, Converting XML to HTML for Display, Displaying XML using CSS and XSL, Rewriting HTML as XML, Relationship between HTML, SGML and XML, web personalization , Semantic web, Semantic Web Services, Ontology.	Classroom teaching ICT tools and Google classroom,
Unit - V	E- Commerce: Business Models, Infrastructure, Creating an E-commerce Web Site, Environment and Opportunities. Modes & Approaches, Marketing &	Classroom teaching, ICT Based and individual presentation and Google classroom

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	Advertising Concepts. Electronic Publishing issues, approaches, legalities and technologies, Secure Web document, Digital Signatures and Firewalls, Cyber crime and laws, IT Act. Electronic Cash, Electronic Payment Systems: RTGS, NEFT, Internet Banking, Credit/Debit Card. Security: Digital Certificates & Signatures, SSL, SET, 3D Secure Protocol.	

Course outcome:

On successful completion of the course students will be able to:
- Develop a web application using server side programming languages and components.
- Apply the web engineering methodologies for Web application development.
- Develop a component based web solution and use UML diagrams to describe such a solution.
- Identify and discuss the security risk of a Web application

Reference Books

- Web Engineering Roger S.Pressman, David Lowe Tata Mc Graw Hill Publication, 2007
- Web Technologies Achyut S Godbole and Atul Kahate Tata McGraw Hill
- Web server Programming Neil Gray Wiley
- Web Technology: A Developer s Perspective Gopalan N P Akilandeswari, PHI

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Web Developer software developer, teaching, scientist, analyst.	Able to understand and manage competition. Able to understand how to develop web based applications	Goal04(quality education) Goal09(Industry ,Innovation and Infrastructure)	Web designing coaching center Service Consultancy, Startup related to E-Commerce.

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SEMESTER- 8th
Course: BE ECE
SUBJECT: INDUSTRIAL ROBOTICS

Subject Code:3TBEC804
Theory Max. Marks:50
Theory Min. Marks:17

COURSE OBJECTIVE:

- To acquire the knowledge of basics of robotics and their importance.
- Understand fundamental theory of robot design.
- To acquire the knowledge on advanced algebraic tools for the description of motion.
- To develop the ability to analyze and design the motion for articulated systems.
- To acquire the knowledge of sensors, actuators and vision system used in robotics.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Robotics Evolution of Robots and Robotics, Laws of Robotics, Progressive Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, The Future Prospects, Notations	Classroom teaching ICT tools and Google classroom,
Unit – II	Coordinate Frames, Mapping and Transforms Coordinate Frames, Description of Objects in Space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Symbolic Modeling of Robots – Direct Kinematic Model Mechanical Structure and Notations, Description of Links and Joints, Kinematic Modeling of the Manipulator, Denavit – Hartenberg Notation, Kinematic Relationship between Adjacent Links, Manipulator Transormation Matrix. Introduction to Inverse Kinematic model.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Robotic Sensors and Vision The Meaning of Sensing, Sensors in Robotics, Kinds of Sensors used in Robotics, Robotic vision, Industrial Applications of Vision-Controlled Robotic Systems, Process of Imaging, Architecture of Robotic Vision Systems, Image Acquisition, Description of Other components of Vision System, Image Representation, Image Processing.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Robot Applications Industrial Applications, Material Handling, Processing Applications, Assembly Applications, Inspection Application, Principles for Robot Application and Application Planning, Justification of Robots, Robot Safety, Non-Industrial Applications, Robotic application for sustainable Development.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

- Apply knowledge of robotics for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development robots
- Demonstrate creativeness in designing and development of robotics.
- Identify, analyze and design of robots useful to the society.

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Deputy Registrar (Academic)
Dr. C.V. Raman University
Kota, Bilaspur (C.G.)

Text Books:

- Robotics & Control
- R.K. Mittal & I.J. Nagrath
- TMH Publications
- Robotics for engineers
- Yoram Korean
- McGrew Hill Co

Reference Books

- Robotics Control Sensing, Vision and Intelligence K. S. Fu, R. C. Gonzalex, C. S. G. Lee Mc Grew hill Book co.
- Kinematics and Synthesis of linkages Hartenberg and Denavit McGrew Hill Book Co
- Kinematics and Dynamics of Machinery J. Hirchhorn McGrew Hill Book Company

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Production In charge, Manager,	Creative designing for different parts of automobile, problem solving for failure and fault	Goal04(quality education) Goal09(Industry ,Innovation and Infrastructure)	Show rooms and manufacturing industries.

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SEMESTER- 8th
Course: BE ECE
SUBJECT: Major Project

Subject Code:3TBEC805
Theory Max. Marks:100
Theory Min. Marks:50

COURSE OBJECTIVE:

Syllabus:

The student should prepare a working system or some design or understanding of a complex system that he has selected from the previous semesters using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with a demonstration of the working system.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Understand and analyze the problem related to engineering	Goal04(quality education)	

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SEMESTER- 8th **Subject Code:3TBEC806**

Course: BE ECE

SUBJECT: Seminar and Group Discussion

COURSE OBJECTIVE:

Syllabus:

The student should select a topic (from the subjects he has studied so far or any topic related to real life problem). He should do the literature survey, analyze the problem and propose some solution for the same. He should prepare a detailed (typed) report regarding the topic and should present the same with the help of power point presentation at the end of the semester. The analysis of the problem may be done with the help of some software or any hardware (which may be made by the student.

Chairperson Dean (Registrar) (Board of Studies) (Academic Council) Seal

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Get the skill to represent any topic related to the studies.	Goal04(quality education)	

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