ANNEXURE II

B.Tech. Semester-I (Electronics and Communication/Electronics Engineering-Major)

S N	Course Category	Course Code	Name of Course	BoS	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
									Theory				Practical		
					(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	BSC - I	BET1T01	Applied Mathematics I	ASH	3	-	-	3	3	70	30	45	-	-	-
2	BSC – II	BET1T02	Semiconductor Physics	ASH	2	-	-	2	3	70	30	45	-	-	-
3	BSC – II	BET1P02	Semiconductor Physics Lab	ASH	-	-	2	1	-	-	-		25	25	25
4	ESC – I	BET1T03	Programming for Problem Solving	ETRX	3	-	-	3	3	70	30	45	-	-	-
5	ESC – I	BET1P03	Programming for Problem Solving lab	ETRX	-	-	2	1	-	-	-	-	-	50	25
6	ESC – II	BET1T04	Basic of Electrical & Electronics Engg.	ETRX/EE	3	-	-	3	3	70	30	45	-	-	-
7	ESC – II	BET1P04	Basic of Electrical Electronics Engg Lab	ETRX/EE	-	-	2	1	-	-	-	-	25	25	25
8	AEC-I	BAE1T01	English for Professional Communication	ASH	1	0	0	1	2	35	15	23			
9	AEC-I	BAE1P01	English for Professional Communication Lab	ASH	0	0	2	1	`--	`--	`--	--	25	25	25
10	VSC - I	BVS1P01	Electronics Workshop-I	ETRX	-	-	4	2	-	-	-	-	50	50	50
11	CC – I	BCC1P01	Refer CC Basket	ASH	-	-	4	2	-	-	-	-	-	100	50
			Total		**12**	**-**	**16**	**20**		**315**	**135**		**125**	**275**	

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY

B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit : 3	**Lecture (L): 3 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BET1T01**	**Applied Mathematics-I**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	The topics covered will equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power.
2	The aim is to inculcate and develop the basic mathematics skills of engineering students that are imperative for effective understanding of engineering subjects.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Analyse real world scenarios to recognize when derivatives or integrals are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results.
2	Appreciate ODE and system of ODEs concepts that are encountered in the real world, understand and be able to communicate the underlying mathematics involved to help another person gain insight into the situation.
3	Apply knowledge of mathematics, physics and modern computing tools to scientific and engineering problems.
4	Develop an ability to identify, formulate and/or solve real world problems.
5	Understand the impact of scientific and engineering solutions in a global and societal context.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Unit-1 Differential Calculus			
Successive differentiation: Leibnitz's Rule, Taylor's and Maclaurin's series for function of one variable, Indeterminate forms and L' Hospital's Rule.	7		1
Unit 2: Multivariable Calculus (Differentiation)			
Functions of several variables, First and Higher order partial derivatives, Euler's theorem, Chain rule and Total differential coefficient, Jacobians, Lagrange's method of undetermined multipliers.	5		2
Unit 3: Matrices			
Rank of a matrix, Consistency of linear system of non-homogeneous equations, Linear dependence of vectors, Eigen values and Eigen vectors, Reduction to diagonal form, Cayley-Hamilton theorem.	10		3

Unit 4: First Order Ordinary Differential Equations			
Linear, Reducible to linear and Bernoulli's differential equations, Exact differential equations (Excluding the cases of integrating factors), Application of first order differential equation to simple electrical circuits.	5		4
Unit-5:Higher Order Ordinary Differential Equations			
Higher order ordinary linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations, Applications of higher order differential equations to simple electrical circuits.	9		5

Text/Reference Books:

(1) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
(2) Ramana B.V., Higher Engineering Mathematics, Tata Mc-Graw Hill, New Delhi, 11th Reprint, 2010.
(3) N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
(4) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
(5) P. N. Wartikar and J. N. Wartikar, Applied Mathematics, Volume I and II.
(6) H.K Dass, Rama Verma, Rajnish Verma, V.J. Dagwal, Sajid Anwar and D.F. Shastrakar, Engineering Mathematics, Volume I and II, S. Chand.

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B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit : 2	**Lecture (L): 2Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BET1T02**	**Semiconductor Physics**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	To introduce ideas of quantum mechanics necessary to understand the function of semiconductor devices
2	To familiarize prospective engineers with fundamental concepts of semiconductors and their applications in semiconductor technology

Course Outcomes	
After completion of syllabus, students would be able to	
1	Learn the basic concepts of the dual nature of matter and wave packet and apply them to analyze various relevant phenomena and to solve related numerical problems.
2	Apply concepts in interference and diffraction to solve relevant numerical problems and to relate to relevant engineering applications
3	Identify and explain different types of diodes, transistors, and its applications.
4	Learn and explain quantum transitions and apply them to the working of lasers.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Unit-1 Quantum Mechanics			
Concept of wave-particle duality, De-Broglie Hypothesis, Matter Waves, Davisson-Germer Experiment; Bohr's Quantization condition. Concept of wave packets, Heisenberg Uncertainty Principle. Schrodinger wave equation (time dependent and time independent), Wave function Ψ and normalization condition, Application to one dimensional infinite potential well.	6		1
Unit 2: Wave optics			
Huygen's principle, superposition of waves and interference of light by wavefront splitting and amplitude splitting, Interference in thin films, Interference in Wedge-shaped thin film, Newton's rings, and Anti-reflection coating.	6		2
Unit 3: Semiconductor Devices			
Semiconductor, Classification, Pure and doped semiconductors. Types of Semiconductor diodes -P-N junction Diode, Tunnel Diode, Zener Diode, Light Emitting Diode (LED), Photodiode. Transistors, Hall Effect, Hall voltage, and Hall coefficient; its applications.	6		3

Unit 4: Lasers			
Quantum Transitions: Absorption, Spontaneous emission & stimulated Emission, Metastable states, Principle of laser, Laser characteristics, Coherence length and coherence time, Pumping schemes: Three level and Four level. Optical Resonator, Construction & working of Ruby laser and He-Ne laser, Semiconductor diode laser, Applications of laser.	6		4

Text Books & Reference Books

1. P. M. Mathews and K. Venkatesan, A Textbook of Quantum Mechanics, Tata Mc Graw Hill (1977).
2. J. L. Powell and B. Crasemann, Quantum Mechanics, Narosa Publishing House (1993).
3. Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 5th edition, (1983).
4. A. J. Dekker, Solid State Physics, Prentice Hall of India (1971).
5. A Textbook of Engineering Physics, Dr. M. N. Avdhanulu, Dr. P. G. Kshirsagar, S. Chand Publication
6. Text book of Applied Physics, Dr. D. S. Hardas, Dr. D. S. Bhoumik, Dr.S. Shastri, Das Ganu Publication ISBN-978-93-84336-59-2 (2021)
7. Applied Physics, M. N. Avdhanulu, Shilpa A. Pande, Arti R. Golhar, Mohan Giriya, S. Chand
8. A Text Book of Engineering Physics Dr. DevashreeHardas& Dr. Ashish Panat, Das Ganu Publication ISBN-978-81-921757-7-5 (2011)
9. Applied Physics, - Dr. (Mrs)S.P. Wankhede, Dr.ShrutiPatle, Dr.(Mrs.)S.U.Bhonsule and Dr.N. S. Ugemuge DNA Publication ISBN-978-81-945174-6-7 (2020)
10. Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles by R. Eisberg and R. Resnick, Wiley and Sons
11. Engineering Physics, second edition, Sanjay Jain, G. Sahasrabudhe, University's Press(India) Pvt. Ltd.(2016)
12. D. J. Griffiths, Quantum mechanics, Prentice Hall of India Private Limited, New Delhi
13. L. I. Schiff, Quantum Mechanics, TMH Publications
14. Advanced Engineering Materials - Dr. Sangeeta G. Itankar, Dr. Manjusha Dandekar, Dr. Tushar R. Shelke, Dr. Swati Fartode, Alliance & Co. ISBN 978-93-91322-12-0 (2023)
15. Applied Physics- Dr. Sangeeta G. Itankar, Dr. Manjusha Dandekar, Dr. Tushar R. Shelke, Dr. Swati Fartode, Alliance &Co. ISBN 978-93-91322-97-7 (2023)
16. David Halliday, Robert Resnick, Jearl Walker, Principles of Physics, 10th Edition, John Wiley and Sons (2017)
17. Advanced physics - Dr.Shruti Patle, Dr.(Mrs).S.U.Bhonsule, Dr.Ashish N. Bodhaye, Dr.ManoharD.Mehare DNA Publication (2019)
18. Engineering Physics - Dr.N. S. Ugemuge, Dr.(Mrs.)S.U.Bhonsule and Dr.ShrutiPatle DNA Publication(2019)

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B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit :1	**Practical (P): 2 Hrs.**		
Subject Code	**BET1P02**		**Semiconductor Physics**
Examination Scheme - Practical			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
25 Marks	**25 Marks**	**25 Marks**	**--**

List of Experiments: Performance of at least eight experiments is compulsory in a semester.

Exp. No.	**List of Experiments**
1	Energy gap of semiconductor /thermistor.
2	Parameter extraction from V-I characteristics of PN junction diode.
3	Parameter extraction from V-I characteristics of Zener diodes.
4	Parameter extraction from V-I characteristics of PNP/NPN transistors in CB and CE mode.
5	V-I Characteristics of Tunnel diode.
6	V-I Characteristics of Light Emitting Diodes/ Determination of Plank's constant by using LEDs.
7	Study of Diode rectification.
8	Study of Hall Effect and determination of Hall Voltage of a given sample.
9	Variation of Hall coefficient (RH) with temperature.
10	To study the B-H curve and to find out the values of coercivity, retentivity, and saturation magnetization of the experimental material.
11	Determination of NA for optical fiber
12	Calibration of Time Base circuit of CRO and determination of AC, DC voltage & frequency of electrical signals using CRO.
13	To determine the number of lines per cm on a diffraction grating using a LASER beam.
14	Virtual Lab: Experiment on the determination of the thickness of a thin foil using an air wedge arrangement.
15	Virtual Lab: Experiment on the determination of the refractive indices of the material corresponding to ordinary and extra - ordinary rays.

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B.TECH. ELECTRONICS & TELECOMMUNICATION/ ELECTRONICS AND COMMUNICATION/ ELECTRONICS ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit:	**Lecture (L): 3 Hrs**	**Tutorial/Activity (T/A): 0 Hrs.**	**Practical (P): 0 Hrs.**
Subject Code	**BET1T03**	**Name of Subject: Programming for Problem Solving**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Maximum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objective	
1	To understand the basic concepts of Object Oriented Programming.
2	To implement the concepts of Inheritance in Problem solving
3	To apply the concepts of Polymorphism and Interfaces.
4	To implement the concepts of Exception Handling
5	To design and implement a program using a file system.

Course Outcome	
After completion of syllabus student able to	
1	Student will be able to understand the basic concepts of Object Oriented Programming and design simple java programs.
2	Students will be able to use concepts of classes, objects and multithreading to develop inter process communication.
3	Students will be able to apply the knowledge of Inheritance, polymorphism in program development.
4	Students will be able to apply the knowledge of interfaces and packages in program development.
5	Students will be able to handle various exceptions using concepts of exception handling on file streams and operations in java programming for a given application programs.

06-12-24 6/12/2024 Dr. V.K. Takarande 06/12/2024 R.Rawal 6/12/24 6/12/24

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit 1: Introduction	7		1
Introduction: Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If, else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue, Methods.			
Unit 2 : Classes and Objects	8		2
Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.			
Unit 3: Inheritance and Polymorphism	7		3
Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding, Handle multilevel constructors – super keyword, Stop Inheritance - Final keywords. Polymorphism: dynamic binding, method overriding, abstract classes and methods;			
Unit 4: Interfaces and Packages	7		4
Interface: Interfaces vs. Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface. Packages: Defining, creating and accessing a package, understanding Class path, importing packages.			
Unit 5: Exception Handling and I/O Streams	7		5
Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, GUI components in Java, Introduction to Database Connectivity. I/O Streams: Concepts of I/O streams, Reading console Input and Writing Console output, File Handling.			

Text Books:

1. Herbert Scheldt, "Java, the complete reference", McGraw Hill, Osborne, 7th Edition,2011.

Reference Books:

1. T. Budd, "Understanding Object- Oriented Programming with Java", PearsonEducation, Updated Edition (New Java 2 Coverage), 1999.

06-12-24

Dr. V. K. Taksande 06/12/2024

6/12/24

6/12/24

6/12/2024

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY,NAGPUR
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B.TECH. ELECTRONICS & TELECOMMUNICATION/ ELECTRONICS AND COMMUNICATION/ ELECTRONICS ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit :1	**Practical (P): 2 Hrs.**		
Subject Code	**BET1P03**	**Programming for Problem Solving**	
Examination Scheme - Practical			
Internal Marks:	**University Marks:**	**MinimumPassing Marks:**	**Examination Duration:**
50 Marks	**-**	**25 Marks**	**--**

Practical Course Objectives	
1	To understand the basic concepts of Object Oriented Programming.
2	To implement the concepts of Inheritance in Problem solving.
3	To apply the concepts of Polymorphism and Interfaces.
4	To implement the concepts of Exception Handling
5	To design and implement various data structures and file handling.

Practical Course Outcomes	
After completing the practical course, students will be able to	
1	Choose appropriate data structure based on the specified problem definition andanalysis the algorithm.
2	Handle operations like searching, insertion, deletion and traversing mechanism on various data structures.
3	Apply the knowledge of Inheritance in program development.
4	Develop programs using polymorphism and interfaces.
5	Handle various exceptions using concepts of exception handling.

6/12/2024 6/12/24 (Dr. V.K. Tarkasade) 06/12/2024 06-12-24 RRaut 6/12/24

LIST OF PRACTICAL:

Pr. No.	**List of Practical**
1	Programs based on Introduction to Problem Solving.
2	Programs based on java operators and control statements.
3	Program based on classes and objects.
4	Program based on Inheritance
5	Program based on Polymorphism.
6	Program based on Exception Handling
7	Program based on IO streams.
8	Program based on File handling.

06-12-24 6/12/24 (D. V. K. Taksande) 06/12/2024 PRaut 6/12/24 6/12/2024

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FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit : 3	**Lecture (L): 3 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BET1T04**	**Basic of Electrical and Electronics Engineering**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	To introduce basic ideas and principles of Electrical Engineering
2	To study construction and operation of electrical devices- transformers, generators and motors.
3	To acquire knowledge on fundamentals of semiconducting devices.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Acquire basic concepts of electric and magnetic circuit.
2	Analyze ac series circuits
3	Explain construction, working and applications of single-phase transformers and electric machines..
4	Discuss 3-phase power generation and basic power system.
5	Explain operation and applications of semiconducting devices – diode and BJT.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Unit 1: Basics of Electrical Circuits			
Equivalent resistance. Kirchhoff's Laws. Current and Voltage division rule. Electrical Sources, Source Transformation. Basics of Magnetic circuits and parameters, Right hand grip rule. Magneto motive Force. Fleming's Left-hand Rule. Reluctance. Magnetic hysteresis and hysteresis loss. Faraday's laws of electromagnetic induction, Lenz's Law., Fleming's Right-hand rule. Comparison of Electric and Magnetic Circuits.	7		1
Unit 2: Generation of alternating voltage.			
Values of alternating quantity, Form factor and peak factor, Concept of phasor and its mathematical representation. Concept of phasor diagram. Power in a.c. circuit, concept of power factor, reactive power and apparent power with power triangle, Analysis of purely resistive (R), inductive (L), and capacitive (C) circuits. Concept of inductive and capacitive reactance. Analysis of series R – L, R – C, and R – L – C circuits for voltages and current, their waveforms, phasor diagram,	8		2

impedance triangle, power factor, Series resonance.			
Unit 3: Transformer			
Introduction, Basic Principles, Construction, Phasor Diagram for Transformer under No Load Condition, Transformer on Load, Basic idea of Losses in transformer, Voltage Regulation and Efficiency. Introduction to Generator and Motors, Introduction, Working, Construction and applications of - 1) DC Motors 2) Induction Motors (3-phase)	8		3
Unit 4: Three phase AC generation			
Voltage and current relations in star and delta connections. Introduction to Power system- Introduction to Power Generation (Thermal, Hydro, Nuclear and Solar) with block schematic presentation only. Single line diagram for Generation, Transmission & Distribution through different voltage levels.	4		4
Unit 5: Application of semiconductor diodes			
Rectifier, Clipping and clamping circuits. Introduction to BJT- NPN and PNP, Modes of operation, Configuration and its Characteristics, BJT as switch and amplifier.	9		5

Text Books:

1. D. C. Kulshrehtha, "Basic Electrical Engineering", Tata Mcgraw Hill, 2012.
2. S.K. Bhattacharya, “Basic Electrical and Electronics Engineering”, Pearson Education, 2012.
3. Millman Halkias, “Electronic Devices and Circuits”, Tata McGraw Hill, 2000

Reference Books:

1. Kothari D.P. and Nagrath I.J., “Theory and Problems of Basic Electrical Engineering,” Prentice Hall
2. Edward Hughes, “Electrical Technology”, Pearson Education, 2008
3. Basic Electrical Engineering A Web course of NPTEL by Day, Bhattacharya & Roy, Available: - www. nptel.ac.in

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FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit :1	**Practical (P): 2 Hrs.**		
Subject Code	**BET1P04**	**Basic of Electrical and Electronics Engineering**	
Examination Scheme - Practical			
Internal Marks:	**University Marks:**	**MinimumPassing Marks:**	**Examination Duration:**
25 Marks	**25 Marks**	**25 Marks**	**--**

Practical Course Objectives	
1	To introduce basic ideas and principles of Electrical Engineering
2	To study construction and operation of electrical devices- transformers, generators and motors.
3	To acquire knowledge on fundamentals of semiconducting device

Practical Course Outcomes	
After completing the practical course, students will be able to	
1	Acquire basic concepts of electric and magnetic circuits.
2	Analyze ac series circuits
3	Explain construction, working and applications of single-phase transformers and electric machines.
4	Discuss 3-phase power generation and basic power system.
5	Explain operation and applications of semiconducting devices – diode and BJT.

LIST OF PRACTICAL:

Pr. No.	**List of Practical**
1	Measure voltage current and power in 1 phase circuit with resistive load.
2	Measure voltage current and power in R L series circuit.
3	Determine transformation ratio (K) of 1 phase transformer\
4	Connect single phase transformer and measure input output quantities.
5	Identify various passive electronic components in the given circuit.
6	Connect resistors, capacitors in series and parallel combination on bread board and measure its value using a multimeter.
7	Identify various active electronic components in the given circuit.
8	Test the performance of PN junction diode.
9	Test the performance of Zener diode.
10	Test the performance of NPN transistor

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FACULTY OF SCIENCE & TECHNOLOGY

B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit : 1	**Lecture (L): 1 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BAE1T01**	**English for Professional Communication Skills**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
15 Marks	**35 Marks**	**23 Marks**	**2 Hours**

Course Objectives	
1	Students would be able to enhance their communication skills.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Construct grammatically correct sentences.
2	Identify and overcome barriers of communication.
3	Demonstrate good Listening and speaking skills.
4	Develop effective reading and writing skills.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
UNIT 1			
Grammar: Tenses and its types, sentences and its Types, Transformation of Sentences (Assertive, Affirmative, Negative, Interrogative, Exclamatory) Reported speech	4		1
UNIT 2			
Introduction to Communication, Importance of communication Types of communication - Verbal and non-verbal Communications: - Kinesics, Vocalics, Chronemics, Haptics, Proxemics), Barriers to communication and methods to overcome them.	3		2
UNIT 3			
Introduction to LSRW Skills-, Listening Skills: Importance of listening, Types of listening, listening barriers and methods to overcome, Speaking Skills: Components of public speaking, Essential steps for public speaking, Overcoming stage fear in public speaking, Do's, and Don'ts of Public speaking	4		3
UNIT 4			
Reading Skills: Importance of reading skills, Types of reading, comprehending passages, Writing Skills: Importance of effective writing, Paragraph writing, Email etiquettes.	3		4

References Books:

1. Technical Communication by Meenakshi Raman and Sangeeta Sharma, OUP
2. Public Speaking and Influencing Men in Business by Dale Carnegie 3. Professional Communication Skills by Bhatia and Sheikh, S. Chand Publications
4. Communication Skills by Sanjeev Kumar and Pushpalata, OUP
5. Communication Skills by Lalita Bisen, Bhumika Agrawal, N. Thejo Kalyani, Himalaya Publishing House

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B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING

Sem: I	**Total Hours Distribution per week**		
Total Credit :1	**Practical (P): 2 Hrs.**		
Subject Code	**BAE1P01**	**English for Professional Communication Skills**	
Examination Scheme - Practical			
Internal Marks:	**University Marks:**	**MinimumPassing Marks:**	**Examination Duration:**
25 Marks	**25 Marks**	**25 Marks**	**--**

List of Experiments: Any 8 experiments

Exp. No.	**List of Experiments:**
1	Barriers to Communication
2	Non-verbal Communication
3	Listening Skills
4	Reading Skills
5	Speaking Skills
6	Presentation Skills
7	Group Discussion
8	Interview Techniques
	Beyond/Additional Syllabus Experiments
9	Development of Word Power
10	Use of Figurative language

Textbooks/Reference Books:

1 Technical Communication by Meenakshi Raman and Sangeeta Sharma, OUP

2 Public Speaking and Influencing Men in Business by Dale Carnegie

3 Professional Communication Skills by Bhatia and Sheikh, S. Chand Publications

4 Communication Skills by Lalita Bisen, Bhumika Agrawal, N.Thejo Kalyani, Himalaya

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Sem: I	**Total Hours Distribution per week**		
Total Credit :2	**Practical (P): 4 Hrs.**		
Subject Code	**BVS1P01**	**Electronics Workshop I**	
Examination Scheme - Practical			
Internal Marks:	**University Marks:**	**MinimumPassing Marks:**	**Examination Duration:**
50 Marks	**50 Marks**	**50 Marks**	**--**

Practical Course Objectives	
1	To study basic concepts, all active, passive components, sensors, actuators, and different types of Electronic components used DC circuits, AC circuits, semiconductors, Semiconductor devices, Power supply, Bipolar and Field effect transistor amplifiers, Frequency response of amplifier.

Practical Course Outcomes	
After completing the practical course, students will be able to	
1	Explain the Basic Concepts of Different Semiconductor Components with Their Usage Physically As Per Their Types
2	Use Semiconductor Devices in Different Electronic Circuits and Projects.
3	Calculate Different Performance Parameters of Active and Passive Devices and their Datasheets.
4	Plot and Study the Characteristics of Semiconductor Devices.

List of Experiments: Performance of at least any eight experiments is compulsory in a semester.

Exp. No.	**List of Experiments**
1	Study of Resistors (All types and their applications)
2	Study of Capacitors (All types and their applications)
3	Study of Inductors (All types and their applications)
4	Study of Diodes-(All types and their applications)
5	Study of Transistors/ MOSFETs/IGBTs
6	PCB Designing on software
7	Study of Photodiodes/Phototransistor
8	Study of Optocoupler
9	Study of Solar Cell
10	Study of Sensors/Encoders/Accelerometer

B.Tech. Sem-II (Electronics and Communication/Electronics Engineering-Major)

S N	Course Category	Course Code	Name of Course	BoS	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
									Theory				Practical		
					(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	BSC–III	BET2T05	Applied Mathematics II	ASH	3	-	-	3	3	70	30	45	-	-	-
2	BSC–III	BET2P05	Applied Mathematics II Lab	ASH			2	1	-	-	-	-	25	25	25
3	BSC–IV	BET2T06	Engineering Chemistry	ASH	3	-	-	3	3	70	30	45	-	-	-
4	BSC–IV	BET2P06	Engineering Chemistry lab	ASH		-	2	1	-	-	-	-	-	50	25
5	ESC– III	BET2T07	Object Oriented Programming	ETRX	3	-	-	3	3	70	30	45	-	-	-
6	ESC– III	BET2P07	Object Oriented Programming lab	ETRX			2	1	-	-	-	-	25	25	25
7	PCC – I	BET2T08	Digital Electronics & Logic	ETRX	2	-	-	2	2	70	30	45	-	-	-
8	IKS–I	BIK2T01	Refer IKS Basket	ASH	2	-	-	2	2	70	30	45	-	-	-
9	SEC - I	BSE2P01	Refer SEC Basket	ETRX	-	-	4	2	-	-	-	-	50	50	50
10	CC– II	BCC2P02	Refer CC Basket	ASH	-	-	4	2	-	-	-	-	-	100	50
			Total		**13**	**-**	**14**	**20**		**350**	**150**		**100**	**250**	

Exit option: Award of UG Certificate in Major with 40 credits and an additional 8 credits in skill-based courses, internship, mini projects etc.

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Sem: II	**Total Hours Distribution per week**		
Total Credit : 3	**Lecture (L): 3 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BET2T05**	**Applied Mathematics-II**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	The objective of the course is to inculcate and strengthen analytical ability among the engineering students and to create zeal of working with higher mathematics and its applications in the extensive field of engineering. The topics covered will serve as the basic tool for specialized studies in the field of engineering and technology

Course Outcomes	
After completion of syllabus, students would be able to	
1	Analyze real world scenarios to recognize when integrals are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results.
2	Define and understand the geometry of vector differential operators and line and surface integrals.
3	Explain and apply principles of study design and data collection
4	Develop an ability to identify, formulate and/or solve real world problems.
5	Understand the impact of scientific and engineering solutions in a global and societal context.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Unit-1 Integral Calculus			
Evaluation of Definite and Improper Integrals: Beta and Gamma functions and their properties, Mean value, Mean square value and Root mean square value, Tracing of curves (Cartesian), Applications of definite integrals to find length of curve, area, volume.	10		1
Unit 2: Multivariable Calculus (Integration)			
Multiple Integration: Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to Polar). Applications on Area, Mass, Volume	10		2
Unit 3: Vector Calculus			
Vector Calculus: Vector triple product, Product of four vectors, Scalar point function, Vector point function, Vector differentiation, Gradient, Divergence and Curl, Directional derivatives, Solenoidal and Irrotational motions	8		3

Unit 4: Statistics			
Fitting of a Curve by Method of Least Squares: Straight line y = a + b x, Second degree parabola $y = a+bx+cx_2$ and curves of the type y = a e raise to bx, y = a b raise to x and y = a x raise to b, Coefficient of correlation and Lines of regression, Rank correlation.	8		4
Unit-5:Numerical Methods			
Error Analysis, Solution of Algebraic and Transcendental Equations: Method of False position, Newton–Raphson method and its convergence, Solution of system of simultaneous linear equations: Crout's method (LU decomposition Method), Gauss-Seidel method.	8		5

Text/Reference Books:

(1) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(2) Ramana B.V., Higher Engineering Mathematics, Tata Mc-Graw Hill, New Delhi, 11th Reprint, 2010.

(3) N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

(4) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

(5) P. N. Wartikar and J. N. Wartikar, Applied Mathematics, Volume I and II.

(6) H.K Dass, Rama Verma, Rajnish Verma, V.J. Dagwal, Sajid Anwar and D.F. Shastrakar, Engineering Mathematics, Volume I and II, S. Chand.

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Sem: II	**Total Hours Distribution per week**		
Total Credit :1	**Practical (P): 2 Hrs.**		
Subject Code	**BET2P05**	**Applied Mathematics-II**	
Examination Scheme - Practical			
Internal Marks:	**University Marks:**	**MinimumPassing Marks:**	**Examination Duration:**
25 Marks	**25 Marks**	**25 Marks**	**--**

Practical Course Objectives	
1	The computational Mathematics Lab course will consist of experiments demonstrating the principles of Mathematics relevant to the study of Science and Engineering. Students will show that they have learnt Laboratory skills that will enable them to properly acquire and analyze the data in the lab and draw valid conclusions. On successful completion of the course students shall be able to:

Practical Course Outcomes	
By using open source software SageMath Students will be able to	
1	Download SageMath and use it as an advance calculator.
2	Sketch and analyze function graphs.
3	Apply the concepts of differential calculus to find extreme value of continuous functions and analyze solutions of differential equations
4	Evaluate improper integrals and its applications to find length, area, volume, centre of gravity and mass.
5	Analyze and calculate eigen values, eigen vectors, rank nullity, and solve system of linear equations of a matrix / linear map.
6	Analyze the data to find best fit curve.

LIST OF PRACTICALS: Performance of at least **SIX** practical is compulsory in a semester.

Pr. No.	**List of Practicals**
1	To use SageMath as advanced calculator
2	2D Plotting with SageMath
3	3D Plotting with SageMath
4	Differential Calculus with SageMath
5	Solution of differential equations in SageMath
6	Basics of Linear Algebra
7	Curve Fitting by using SageMath
8	Integral Calculus with SageMath

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Sem: II	**Total Hours Distribution per week**		
Total Credit: 3	**Lecture (L): 3 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BET2T06**	**Engineering Chemistry**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	To create awareness about various materials used in modern technology and their interaction amongst themselves as well as environment
2	To make students learn about the environment and ensure sustainable development.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Apply the basics concepts of electrochemistry & corrosion technology.
2	Know about fuels and lubricants and analyze the situation for their appropriate applications.
3	Analyze the various industrial problems arising due to water quality and their remediation.
4	Develop environmental awareness from the basics of green chemistry and its application.
5	Inculcate the use of instrumentation techniques and interpret its applications in material characterization.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Unit-1: Electrochemistry and Corrosion Technology			1
A] Electrochemistry: Electrochemical & Galvanic Series, Electrochemical & Electrolytic cell, Battery: Introduction, types, characteristics, components/materials, working and applications of Lithium-cobalt oxide and metal air batteries. Super capacitors: Introduction, types (EDLC, pseudo and asymmetric capacitor) with examples and applications. Energy conversion devices: Introduction, characteristics, materials, working and applications of H2-O2 fuel cells, amorphous Si and quantum dye sensitized solar cells.	4		
B] Corrosion: Theories of Corrosion (Dry, Wet and Differential Aeration), Pilling-Bedworth Rule & Numerical, Factors affecting corrosion, Types of Corrosion (Intergranular & Stress), Corrosion Protection- Design & Material Selection, Cathodic Protection (Galvanic & Impressed Current)	3		
Unit-2: Fuels & Lubricants			2
A] Fuels: Introduction: Calorific value, Higher and lower calorific value; determination of calorific value by Bomb and Boy's calorimeter; numerical based on calorific value determination; Liquid fuels –fractional distillation of crude petroleum (boiling point wise separation only) use of gasoline and diesel in internal combustion engine: knocking and chemical constitution of	4		

fuel, Octane and Cetane number, doping agents, Introduction to propellants and its classification. Combustion calculations – Numericals based on combustion calculations for solid, liquid and gaseous fuels			
B] Lubricants: Lubrication, Mechanism of lubrication, types of lubricants and its properties (viscosity & viscosity index, flash & fire point, aniline point, saponification value, acid value), criterion for selection of lubricants	3		
Unit-3: Water Technology			
A] Water Purification Technology: Principles of coagulation and flocculation, Sterilization by using ozone and chlorine (Cl_2 gas & chloramine), Break point chlorination and its significance.	3		
Industrial Water Treatment: Softening of water-principle- reactions, advantages, limitations and comparison of Zeolite process, and De-mineralization process. Numerical based on Zeolite process.	2		
B] Boiler Troubles–Causes, effect on boiler operation and methods of prevention – Scales and sludges, Caustic embrittlement. Desalination of sea water- Principle, method and advantages of electro dialysis and reverse osmosis processes. Waste Water Treatment (introduction and importance) –Water treatment from biological waste water to clean water production (Dissolved Air Floatation and Membrane bio reactors)	2		3
Unit-4: Green Chemistry			
A] Green Chemistry: Introduction, twelve principles of Green chemistry with examples, Numerical based on atom economy, Carbon sequestration & Carbon Credits	3		
B] Green reagents, Dimethyl carbonate and its applications, Supercritical carbon dioxide properties and applications	2		4
Biopolymers: Classification based on type, properties and applications of collagen, chitosan, starch.	2		
Unit – 5: Material Characterization Techniques			
Principles and applications of –			
A] Electronic Spectroscopy (Beer-Lambert's law and its numerical), Infra-Red spectroscopy and Nuclear Magnetic Resonance spectroscopy.	4		
B] Thermal analysis (Thermogravimetry, Differential Thermal Analysis, Differential Scanning Calorimetry), Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Brunauer-Emmett-Teller (BET) surface area analysis, X-ray Diffraction Analysis, particle size analyser (Dynamic Light Scattering), High Performance Liquid Chromatography and Gas Chromatography	3		5

References/ Text Books

1. Engineering Chemistry, S S Dara, S Chand Publication
2. Engineering Chemistry, Jain & Jain, Dhanpat Rai Publication
3. Applied Chemistry, A V Bharati, Das Ganu Publication
4. Energy & Environment, A V Bharati, Das Ganu Publication
5. Spectroscopy, Y R Sharma, S Chand
6. Green Chemistry for Beginners, Anju Srivastava, Rakesh K. Sharma, Jenny Stanford Publishing
7. Instrumental Methods of Chemical Analysis, B. K. Sharma, Krishna Prakashan.
8. https://wiki.anton-paar.com/in-en/the-principles-of-dynamic-light-scattering/
9. Fundamentals of Solid Propellant Combustion, Kuo, K.K., Summerfield, M., Progress in Astronautics & Aeronautics, Vol. 90, AIAA. 1984
10. https://onlinecourses.nptel.ac.in/noc24_ae09/preview

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Sem: II	**Total Hours Distribution per week**		
Total Credit :1	**Practical (P): 2 Hrs.**		
Subject Code	**BET2P06**	**Engineering Chemistry**	
Examination Scheme - Practical			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
50 Marks	**-**	**25 Marks**	**--**

List of Practicals (Any 6 performance based and 1 virtual lab experiment)

Exp. No.	**List of Experiments**
1	Proximate Analysis of coal
2	Estimation of viscosity of oil by Redwood Viscometer 1 or 2
3	Estimation of Flash point of lubricating oil by open/ closed cup apparatus
4	Estimation of Acid value of lubricant
5	Estimation of Consistency of grease by penetrometer
6	Estimation of Saponification value of lubricant
7	Estimation of Hardness of water (Total, Permanent & Temporary) by complexometry
8	Estimation of Alkalinity of water (Warder's Method)
9	Estimation of DO / free chlorine estimation
10	Estimation of Copper estimation (iodometrically)
11	Estimation of Ni by complexometry / gravimetry.
12	Fe(II)/ (III) estimation by redox titration.
13	Beer's Law verification by spectrophotometer.
14	Separation of copper nickel ions by paper chromatography.
15	Acid base titration by potentiometry
16	Acid base titration by conductometry
17	Virtual Lab: Experiment on Calorimetry
18	Virtual Lab: Experiment on Spectroscopy

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Sem: II	**Total Hours Distribution per week**		
Total Credit: 3	**Lecture (L): 3 Hrs**	**Tutorial/Activity (T/A): Hrs.**	**Practical (P): 2 Hrs.**
Subject Code:	**BET2T07**	**Name of Subject: Object Oriented Programming**	

Examination Scheme			
Internal Marks:	**University Marks:**	**Maximum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objective	
1	To make students understand Fundamental features of an object oriented language Java: it's object classes and interfaces, exceptions and libraries of object collection
2	Introduce students with fundamental concepts like exception handling, generics, multithreading and streams.

List of Course Outcome	
After completion of syllabus student able to	
1	Understand the principles of object-oriented programming; create classes, instantiate objects and invoke methods
2	Apply the concepts of generics and implement collection classes and develop reusable programs using the concepts of OOP.
3	Apply the concepts of Exception handling to develop efficient and error free Codes for solving classic synchronization problems.
4	Apply the concepts of Multithreading to develop efficient and error free Codes for solving classic synchronization problems.
5	Create design Pattern in Software design process

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
UNIT 1			1
Features of Object Oriented Programming languages, Abstraction, Encapsulation, Inheritance, polymorphism and late binding. Concept of a class, Access control of members of a class, instantiating a class, constructor and method overloading and overriding.	7		
UNIT II			2
Concept of inheritance, methods of derivation, use of super keyword and final keyword in inheritance, run time polymorphism, abstract classes and methods, Interface, implementation of interface, creating packages, importing packages, static and non-static members, Lambda Expressions Introduction, Block, Passing Lambda expression as Argument.	8		

UNIT III			
Exceptions, types of exception, use of try catch block, handling multiple exceptions, using finally, throw and throws clause, user defined exceptions, file handling in Java, Serialization, Generics, generic class with two type parameter, bounded generics. Collection classes: Arraylist,Linked List, Hashset, Treeset.	8		3
UNIT IV			
Multithreading: Java Thread models, creating thread using runnable interface and extending Thread, thread priorities, Thread Synchronization, InterThread communications	6		4
UNIT V			
Introduction to Design Patterns, Need of Design Pattern, Classification of Design Patterns, and Role of Design Pattern in Software design, Creational Patterns, Structural Design Patterns and Behavioral Patterns.	7		5

Text Books:

1. Herbert Schildt; JAVA, the Complete Reference; Ninth Edition, TataMcGraw- Hill Publishing Company Limited.

2. Design Patterns by Erich Gamma, Pearson Education.

Reference Books:

1. Cay S. Horstmann and Gary Cornell; Core JAVA Volume-II Advanced Features; Eighth Edition; Prentice Hall, Sun Microsystems Press2008.
2. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGraw HillEducationPrivateLtd2013

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Sem: II	**Total Hours Distribution per week**		
Total Credit :1	**Practical (P): 2 Hrs.**		
Subject Code	**BET2P07**	**Object Oriented Programming**	
Examination Scheme - Practical			
Internal Marks:	**University Marks:**	**MinimumPassing Marks:**	**Examination Duration:**
25 Marks	**25 Marks**	**25 Marks**	**--**

Practical Course Outcomes	
After completing the practical course, students will be able to	
1	Understand the basics of object-oriented programming using JAVA
2	Apply the concept of classes, Java, JDK Components and develop Simple Java Programs.
3	Develop Simple Java Programs using inheritance and Exception handling.
4	Develop Multi-threading Programming and Interfaces.
5	Develop GUI applications using Applet classes, Swing components and Event handling programs

List of Experiments: Performance of at least Any eight experiments is compulsory in a semester.

Exp. No.	**List of Experiments**
1	WAP to demonstrate data types available in java.
2	WAP to design a simple calculator using switch case statement.
3	WAP to print all prime numbers between 1 to 1000.
4	WAP to implement linear search in 1D array
5	WAP to implement bubble sort in 1 D array.
6	WAP to multiply 2 matrices in java.
7	WAP to implement recursion function in java.
8	WAP to demonstrate some in-built functions on Strings.
9	WAP to demonstrate concept of Class, Object, and methods in java.
10	WAP to demonstrate inheritance in java.
11	WAP to demonstrate method over riding in java.
12	WAP to demonstrate multi-threading in java.
13	WAP to read, write, append data in files.

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Sem: II	**Total Hours Distribution per week**		
Total Credit : 2	**Lecture (L): 2 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BET2T08**	**Digital Electronics & Logic**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	Study various logic gates and apply various optimization techniques to Minimize digital circuits
2	Study and design basic combinational logic circuits
3	Study and design applications of combinational logic circuits
4	Study and design basic sequential logic circuits.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Describe the logic gates and apply various optimization techniques to minimize digital circuits.
2	Design basic combinational logic circuits.
3	Design applications of combinational logic circuits.
4	Design basic sequential logic circuits.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
UNIT 1: Logic Gates & simplification of logic function			
Analog Vs Digital system, Logic Gates and their truth tables, Basic gates implementation using universal gates. Representation of logic functions in SOP & POS forms. Simplification of logic functions using boolean algebra and K-Map (upto 4 variables).	2		1
UNIT 2: Combinational Logic Design-I			
Arithmetic Circuits, Design of Adder(Half and full), Substractor (Half and full), Code converters, Comparator, Parity generators/checkers	3		3
UNIT 3: Combinational Circuit Design- II			
Decoders, BCD - to – 7 segment decoder, Encoders, Priority Encoder, Multiplexer, demultiplexer, Multiplexer/Demultiplexer tree	3		4
UNIT 4: Sequential Circuit Design			
Latches, triggering circuits, Flip- Flops, Types of Flip-Flops as S-R , J-K, Master-Slave JK, D-type and T- type Flip-flops, Excitation table of flip-flops, Conversion of flip-flops	4		5

Textbooks:

1. Morris Mano: “An approach to digital Design”, Pearson Publications.
2. R. P. Jain: “Modern digital electronics” , TMH Publications.

Reference books:

1. WakerlyPearon : “Digital Design: Principles and Practices”, Pearon Education Publications.
2. Mark Bach: “Complete Digital Design”, Tata MCGraw Hill Publications
3. W. Fletcher: “Engg. Approach to Digital Design”, PHI Publications.

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IKS BASKET

Sem: II	**Total Hours Distribution per week**		
Total Credit : 2	**Lecture (L): 2 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BIK2T01A**	**Consciousness Studies**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45Marks**	**3 Hours**

Course Objectives	
1	To provide overview of Indian Knowledge System (IKS) and sensitize the students regarding Consciousness Studies.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Analyze the basics of Psychology and its applications
2	Develop knowledge about the sensory processes and perception
3	Apply various theories of classical conditioning
4	Integrate the theories of memory and behaviour of mind

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
UNIT 1			
An introduction to Psychology Introduction to Psychology, Definition of psychology, history, methods in Psychology, Subfields of Psychology and its applications	6		1
UNIT 2			
Basic Cognitive Processes Sensory processes-general characteristics of senses, visual sense, auditory sense, other senses Perceptual organization-principles of perceptual organization, object perception and perceptual constancies, influences upon perception, extrasensory perception	6		3
UNIT 3			
Learning: Classical conditioning, theories about classical conditioning, Reinforcement and Punishment	6		4
UNIT 4			
Memory: Theories about memory, brain and memory, long term memory, forgetting	6		5

Reference books

1. Clifford T. Morgan, King, Weisz and Schopler, Introduction to Psychology, McGraw Hill Education (India) Private Limited

2. Hilgard, Atkinson and Atkinson (1977). Introduction to Psychology. Tata McGraw Hill

3. Kao H.S R.& Sinha D. (Eds)(1977). Asian perspectives on psychology. New Delhi: Sage

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IKS BASKET

Sem: II	**Total Hours Distribution per week**		
Total Credit : 2	**Lecture (L): 2 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BIK2T01B**	**Preserving Art, Culture & Tradition**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	To provide overview of Indian Knowledge System (IKS) and sensitize the students to the contributions made by Indians in the field of philosophy, art and health.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Interpret basics of Indian Knowledge system
2	Integrate the teaching of Indian culture and civilization
3	Appreciate Indian artistic tradition.
4	Analyze Indian health and wellness system for healthy living

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
UNIT 1			
Introduction to Indian Knowledge System: Introduction and overview of Indian Knowledge system, The Vedic Corpus -Vedas, Types ofVedas, Upavedas, Types of Upavedas	6		1
UNIT 2			
Indian Culture and Civilization Indian culture and Civilization: its characteristics, Difference between Culture and Civilization, Indus valley civilization, Vedic civilization.	6		3
UNIT 3			
Indian Artistic Tradition, Indian Artistic tradition: Chitrakala- Indian style painting (Madhubani, Warli, Phad, Kalamkari, Gond, Mandana), Nritya: Indian dance forms (Bharatnatyam, Kathak, Kathakali, Kuchipudi, Manipuri, Mohiniattyam) Sangeet- Carnatic music & Hindustani music	6		4
UNIT 4			
Health and Wellness, Wellbeing: Mental & Physical, Dimensions of Wellness, Concept of healthy living in Ayurveda, Tri-doshas – Relationship to Health	6		5

Activity: Prepare PPTs/Posters/Videos on any two topics

Reference books

1. Introduction to Indian Knowledge System by Mahadevan, B, Bhat, Vinayak Rajat, Nagendra Pavana R.N., Prentice Hall India Pvt., Limited, 2022.
2. Indian knowledge Systems, Kapil Kapoor, Avadhesh Kumar Singh, D.K, Print world.
3. Traditional Knowledge System in India by Amit Jha, Atlantic Publishers, 2002
4. Exploring The Mysterious, By T.N. Dhar · Mittal Publications, 2004
5. Indian Art & Culture (E), By Anurag Kumar, Arihant Publication India Limited, 2016
6. A History of Indian Philosophy, Volume 2, By Surendranath Dasgupta, Diamond Publishers, 2017
7. Sri Suresh Soni, Sources of our cultural heritage, Prabhat Prakashan, 2018.
8. A Beautiful Tree by Dharampal, Rashtrotthana Sahitya, 2021

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IKS BASKET

Sem: II	**Total Hours Distribution per week**		
Total Credit : 2	**Lecture (L): 2 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BIK2T01C**	**Wellness, Traditional Medicine & Yoga**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	The course will enable engineering students to acquire the knowledge of richness of healthy lifestyle and strong heritage of yoga and Vedas in Indian traditional system.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Understand the importance of a healthy lifestyle
2	Familiarize to manage stress and health consciousness about physical and mental health
3	Appreciate the benefits of yoga and medicinal plant
4	Identify the social changes in Indian society.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
UNIT 1			
Importance of health and wellness, Essential components of balanced diet for healthy living, Processed foods and unhealthy eating habits.	6		1
UNIT 2			
Body systems and common diseases, Sedentary lifestyle and its risk of disease, Stress, anxiety, and depression, Factors affecting mental health.	6		3
UNIT 3			
Importance and benefits of yoga, Purpose of yoga, traditional knowledge of medicinal plant, use of home available herbs and spices.	6		4
UNIT 4			
Vedas and it types, Social change in Indian society, Social stratification and class conflicts.	6		5

Textbooks/References:

1. Sociology in India – Surendra Sharma, Rawat Publication.
2. Bradfird B, Strand and Others. Fitness Education Arizona GorsuchSeani; sbrick Publishers, 1997.
3. Scott K. Powers and Stephen L. Dodd. Total Fitness: Exercise, Nutrition and wellness, Boston: Allyn and Bacon, 1999.
4. Rigveda Samhita with Sayanabhasya, Vaidik Samshodhan Mandal, Pune
5. Riksuktashati, H. D. Velankar, Bharatiya Vidya Bhavan, Mumbai

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING
IKS BASKET

Sem: II	**Total Hours Distribution per week**		
Total Credit : 2	**Lecture (L): 2 Hrs**	**Tutorial/Activity (T/A): 0 Hr.**	
Subject Code	**BIK2T01D**	**Glimpses of Ancient Science & Technology**	
Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks	**70 Marks**	**45 Marks**	**3 Hours**

Course Objectives	
1	To provide the students with scientific foundation of Ancient Indian Knowledge System
2	To create awareness about scientific heritage of the ancient civilization

Course Outcomes	
After completion of syllabus, students would be able to	
1	To provide information about great mathematicians and to help students to trace, identify, practice, and develop the significant Indian mathematics
2	To understand the concept of motion and its application in Indian ancient physics literature.
3	To understand the concepts of basic chemical & metallurgical process of ancient and medieval India.

SYLLABUS

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
UNIT 1			
Mathematics in India: Introduction of inception of Mathematics from vedic periods. Great Mathematician and their contribution (e.g. Arytabhatta, Bhaskara, Brahmagupta, Ramanujan, Pingala, Bhaskara-II), Sulbhasutras (Pythagoras theorem), Square, Square root, Square root of imperfect Squares, Magic Squares, Value of Pi.	6		1
UNIT 2			
Physics in India: Vaisheshikadarshan Atomic theory & law of motion, theory of Panchmahabhoota, BrihathShathaka (divisions of the time, unit of distance), Bhaskarachaya (Introduction to theory of Gravity, Suryasiddhanta & Sidhantashriomani), Lilavati (Gurutvakashan Shakti).	6		3
UNIT 3			
Chemistry in India: Vatsyayana, Nagarjuna, Vagbhaṭa –building of Theras-Shala(laboratory), working arrangements of Ras-Shala, material and equipment, Yaśodhara Bhaṭṭa-processof distillation, apparatus. Metallurgy in India: Survarṇa(gold) and its different types, properties, Rajata(silver), Tamra(copper), Loha(iron), Jasta (zinc),	6		4

Naga /Sisa(lead), Pittala(brass).			
UNIT 4			
	6		5

Text Books Recommended

1. R P Kulkarni, Glimpses of Indian Engineering and Technology (Ancient & Medieval period,MunshiramManoharlal Publishers Pvt. Ltd. 2018
2. AK Pathak, Science and Technology in India, Anshikaprakashanpratapgarh, 2016
3. PB Sharma, S. Narain, Doctors Scientists and Engineers of Ancient India, Kalpaz Publications2017
4. NVP, Unithiri, Indian Scientific Traditions (Professor K.N. Neelakantan Elayath Felicitation Volume), publication division university of Calicut, 2006
5. Anonyms, History of Science in India- Volume-I Part-I (Physics, Mathematics and Statistics), the national academy of science, India & the Ramkrishna mission institute of culture, 2014

Reference Books Recommended

1. Kapur K and Singh A.K (Eds) 2005). Indian Knowledge Systems, Vol. 1. Indian Institute of Advanced Study, Shimla. Tatvabodh of Sankaracharya, Central Chinmay Mission Trust, Bombay,1995
2. Dharmpal, Indian Science and Technology in the eighteen century, Rashtrottahanasahitya, 1983
3. S Biswal, B L Ray, Vedic Science and technology, DK Print world, 2009
4. A.K. Bag, History of technology in Indian (Set 3 vol), Indian Nation Science Academy, 1997.
5. A Gosh, History of Science in India (Volume-I Part-II Astronomy), the national academy of science, India & the Ramkrishna mission institute of culture, 2014

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FACULTY OF SCIENCE & TECHNOLOGY

B.TECH. ELECTRONICS & TELECOMMUNICATION ENGINEERING

Sem: II	**Total Hours Distribution per week**		
Total Credits: 02	**Practical (P): 2Hrs.**		
Course Code	**BSE2P01**	**Name of Course: Skill Enhancement Course (Electronics Workshop-II)**	
Examination Scheme			
College Internal Examination	**Semester End Examination**	**Minimum Passing Marks**	**Examination Duration**
50	**50**	**50**	**----**

Practical Course Outcomes	
After completing the practical course, students will be able to	
1	Understand the various PCB design steps and design PCB for an electronic circuit.
2	Use the simulation software to design electronic circuits.
3	Interface basic electronic circuits to Arduino.
4	Demonstrate Raspberry Pi to implement various electronic projects
5	Build a mini-project based on Arduino and Raspberry-Pi.

List of the Practicals:

1. Study and Identification of various electronic components.
2. Testing of various electronic components using digital multimeter and C.R.O.
3. Design of PCB using PCB Layout design software.
4. Design basic electronic circuits using Electronic simulation software.
5. Study and Hands -on-Arduino Board.
6. Study and Hands -on-Raspberry-Pi module.
7. Mini project using Arduino or Raspberry-Pi.