FY B.TECH ELECTRONICS & TELECOMMUNICATION ENGINEERING

COURSE SYLLABI

FOR

SEMESTER II

W.E.F

AY 2026-27

Government College of Engineering, Karad				
First Year (Sem – II) B. Tech. Electronics and Telecommunication Engineering				
EX3201:Engineering Physics				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/Week		**MSE**	20
Tutorials	00 Hrs/Week		**ISE**	20
Total Credits	03		**ESE**	60
			Duration of ESE	02:30 Hrs

Course Outcomes:

After completion of course the Students will be able to-

CO1.	State and Explain concepts of electrostatics, magneto statics, optics, magnetic and electric materials.
CO2.	Understand physical significance of terms in electrostatics, magneto static and fundamental properties of light, sound and advanced materials.
CO3.	Demonstrate applications of different physical phenomena in engineering and technology.
CO4.	Compute required physical quantity from given data.

	Course Contents	CO	Hrs
Unit 1	**Electrostatics:** Coulomb's law, Vector form of Coulomb's law, its Examples. Electric field, Electrostatic potential, Electrostatic potential due to charged sphere and electric dipole, Examples. Equipotential surface and their properties. Flux, Gauss's law and its applications. Gauss's law electrostatics in a dielectric medium.	CO1, CO2	(07)
Unit 2	**Magnetostatics:** Biot - Savart law, Ampere's law and its applications. Faradays law of induction, Lenz's law, Integral and Differential form of Faradays law. Equation of continuity, Displacement Current. Maxwell equations. Physical significance of Maxwell equations	CO1, CO2	(07)
Unit 3	**Magnetic materials and Ultrasonic:** Origin of magnetic moment, types of of Magnetic material: Dia, Para, ferro, anti-ferro and Ferrimagnetic materials, magnetic exchange interactions. Curie-Weiss law. Hysteresis, Soft and Hard Magnetic Materials, Ferrites, their Applications. Magnetic Devices. **Ultrasonic waves:** Ultrasonic waves, Characteristics of Ultrasonic waves, Magnetostriction oscillator and Piezoelectric, Oscillator, Applications. Problems	CO1, CO2 CO3	(07)
Unit 4	**Semiconductors and Dielectrics** Classification of solids on the basis of band theory, Introduction of Semiconductors and it's types, Fermi level in intrinsic and extrinsic semiconductors, Band diagrams for intrinsic and extrinsic semiconductors, electrical conductivity of conductors & semiconductors. Hall effect carrier life time and mobility and Examples. Applications **Dielectrics:** Introduction of dielectrics, dielectric constant, dielectric polarization, dielectric susceptibility, three field vector, polar, Non polar, Applications.	CO1, CO2 CO3	(07)
Unit 5	**Superconductor and Nuclear Energy:** Introduction, Property of superconductor, Meissner Effect, Type I and Type II superconductor,Concept of Cooper pair, BCS Theory, AC DC Josephson's Effect.Applications. **Nuclear Energy:** Introduction , Fission and Fusion reaction, Energy released in Fission Reaction, chain Reaction, Nuclear Reactor, P-P and C-N Reactions (Thermonuclear Reaction), Examples.	CO2, CO3, CO4	(07)
Unit 6	**LASER and Fibre Optics:** Introduction, Characteristics of LASER beam, Absorption, Spontaneous Emission,	CO2, CO3,	(07)

	of LASER, Lasing action, Solid-state lasers (ruby), Diode Laser, Applications of LASER in science and engineering,Holography Techniques.			

Text Books	
1.	Avadhanulu and Kshirsagar- Engineering Physics ,S Chand publishing
2.	V. Rajendran -Engineering Physics,Tata McGraw-Hill Publishing Company limited
3.	Donald A. Neamen- Semiconductor Physics and Devices: Basic Principles- the McGraw-Hill Companies, Inc, Fourth Edition
Reference Books	
1.	S. O. Pillai, Solid State Physics: Structure & Electron Related Properties, Eastern Ltd,, New Age International Ltd.
2.	Charles Kittle, Introduction to Solid State Physics - Wiley India Pvt. Ltd.(8th Edition).
3.	Alan Giambattista and others- Fundamentals of physics, Tata Mc. Graw Hills
4.	B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi.
5.	R. K. Gaur & Gupta S. L, Engineering Physics -Dhanapat Rai Publication.
6.	Arthur Beiser -Modern Physics - Tata Mc. Graw Hills
7.	K. Thyagarajan, A. K. Ghatak-LASERS Theory and Applications ; Macmillan India Limited.
8.	L. J. Schiff-Quantum Mechanics ; Mc-Graw Hill International Edition.
9.	N. Subramanyam & Brijlal-Text Book of Optics ; (Vikas Publishing House Pvt.Ltd)
Useful Links	
1.	en.wikipedia.org/wiki/ Fundamentals of_Physics
2.	www.hyperphysics.com, www.google.com
3.	physics.info/magnetism, www.youtube.com, Nptl video

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	3	2	1	-	-	1	1	-	-	-	-	-	-	-
CO 2	3	2	1	-	-	1	1	-	-	-	-	-	-	-
CO 3	3	2	1	-	-	1	1	-	-	-	-	-	-	-
CO 4	3	2	1	-	-	1	1	-	-	-	-	-	-	-

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	20
Understand	5	4	-
Apply	5	4	10
Analyse	-	4	20
Evaluate	5	4	10
Create	-	-	-
Total	20	20	60

Government College of Engineering, Karad					
First Year (Sem – II) B. Tech. Electronics and Telecommunication Engineering					
EX3202-Differential and Integral Calculus					
Teaching Scheme			**Examination Scheme**		
Lectures	03 Hrs/week		MSE		20
Tutorials	01 Hrs/week		ISE		20
Total Credits	04		ESE		60
			Duration of ESE		02 Hrs 30 Min

Course Outcomes: After completion of the course the student will be able to

CO1	Solve ODEs and LDE with constant coefficient arising in Engineering domain using analytic approach.
CO2	Apply advance vector integral functions and techniques.
CO3	Trace Cartesian and Polar curves.
CO4	Calculate area enclosed by simple curves and volume of solid with the knowledge of higher order integrals.

	Course Contents	CO	Hours
Unit 1	**First Order Ordinary Differential Equations:** Exact differential equations, Integrating Factor, Equations reducible to Exact, Linear and reducible to linear differential equations, Application to Simple Electrical circuits.	CO1	**(7)**
Unit 2	**Linear Differential Equations with Constant Coefficients:** Linear differential equations with constant coefficients, Methods to find C.F. and P.I. Method to find Particular Integral by shortcut method, method of variation of parameters, Cauchy-Euler equation, Legendre's Equations.	CO1	**(7)**
Unit 3	**Tracing of Curves:** Tracing of curves in Cartesian and polar form, Asymptotes in Cartesian form, Oblique asymptote.	CO2	**(7)**
Unit 4	**Surface Integral and Applications:** Evaluation of double integration in cartesian and polar coordinates, Change of order of integration, change of variable, Area enclosed by plane curves.	CO3	**(7)**
Unit 5	**Volume Integral and Applications:** Evaluation of Triple integration in Cartesian, spherical polar and cylindrical polar coordinates, Volume of solid by triple integral.	CO4	**(7)**
Unit 6	**Vector Integration:** Line integral, Surface integral,Green's theorem in the plane, Stoke's theorem,Volume integral,Gauss Divergence theorem.	CO4	**(7)**

TutorialsFollowing is tentative list of tutorials to be conducted in the tutorial class based on- **(10)**

1. Exact, reducible to exact, linear and reducible to linear differential equations.
2. Applications to differential equations.
3. LDE with constant coefficient.
4. Variation of parameters.
5. Curve tracing of Cartesian curves.
6. Curve tracing of Polar curves.
7. Surface integrations and its applications.
8. Volume integrations and its applications.
9. Line integral, surface integral of vector function.
10 different theorems on vector integrations.

Text Books

1.	H.K.DAS "Advance Engineering Mathematics" S. Chand publications
2.	Debashis Datta "Textbook of Engineering Mathematics'' New Age International Publication.
3.	Ravish R..Singh, Mukul Bhatt. "Engineering Mathematics A Tutorial Approach". Tata, McGraw Hill.

Reference Books

1.	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2.	Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3	W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley

	India, 2009.
4.	S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5.	E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6.	J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGrawHill, 2004.
7.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
Useful Links	
1.	http://www.nptel.iitm.ac.in
2.	www.ocw.mit.edu

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	1	1	-	-	-	-	-	-	-	-	-	-

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	-	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad				
First Year (Sem – II) B. Tech. Electronics and Telecommunication Engineering				
EX3203: Engineering Mechanics				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/week		MSE	20
Tutorials	00 Hrs/week		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO): Students will be able to

1. Understand basic concepts of mechanics
2. Solve problems on equilibrium of rigid bodies, friction
3. Understand trusses, joints, section.
4. Understand centroid and moment of inertia, kinematic and laws of motion with problem.

	Course Contents	CO	Hours
Unit 1	Basic concepts and fundamentallaws, force, systemof forces, resolution and composition of force, resultant, Principal of transmissibility of force, Moment and couple, Varignon's theorem andlawof moment, Equilibrium, freebodydiagram, Lami'stheorem,equilibrium equations, equilibrant force.	**CO1**	**(07)**
Unit 2	Beam: Definition and types of beams, types of loads,types ofsupports, analysis ofsimple by analytical method and virtualwork method to calculate supportreactions. Friction: Concept of friction, angle of friction,coneoffriction, angleof repose. Friction on horizontal plain and on inclined plain.	**CO1**	**(07)**
Unit 3	Analysis of Struss: Types of trusses, Assumption, Methodof Joints, Methodof section, Analysis of simple truss withmax. 7members.Introduction to space truss.	**CO2**	**(07)**
Unit 4	Centroid of plane and composite figures, parallel and perpendicular axis theorems, moment ofinertia of standard shapes from first principle, moment of inertia of composite figures, radius of gyration, Concept of mass moment of inertia.	**CO3**	**(07)**
Unit 5	Kinematics of rectilinear motion, motion curves, Newtons motion Law, Introduction to Projectile.	**CO4**	**(09)**
Unit 6	Kinetics: - De Alembert's principle, work-energy principle, Impulse - momentum principle,Collision of elastic bodies; direct central impact, oblique impact, coefficient of restitution,loss of kinetic energy.	**CO4**	**(05)**

Text Books

1. Engineering Mechanics, S. S. Bhavikatti,New Age International Pvt. Ltd
2. Engineering Mechanics,S. B. Junnerkar
3. Textbook of Applied Mechanics,Khurmi. R. S,Tata McGraw Hill Publishing Company, 5006
4. Engineering Mechanics (Statics and Dynamics),Palanichamy, M. S., and Nagan, S.

Reference Books

- Engineering Mechanics, Irving H. Shames, Prentice Hall of India, New Delhi
- Engineering Mechanics, S. N. Saluja, SatyaPrakashan, New Delhi
- Engineering Mechanics, Irving H. Shames, Prentice Hall of India, New Delhi
- Power Plant Technology, M.M.El Wakil, Tata Mc Graw Hill. Int, 2nd Edition.Reprint, (2010

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	2	2	-	2	2	-	1	-	-	-	-	1	1	1
CO 2	2	2	-	2	2	-	1	-	-	-	-	1	1	
CO 3	2	1	-	2	2	-	1	-	-	-	-	1	1	1
CO 4	-	1	-	2	2	-	1	-	-	-	-	1	1	1

1: Slight(Low) 2: Moderate(Medium) 3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	MSC	ISC	ESE
Remember	10	10	25
Understand	05	05	20
Apply	05	05	15
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad					
First Year (Semester – II) B. Tech. Electronics and Telecommunication Engineering.					
EX 3204: Transducers and Measurements					
Teaching Scheme			**Examination Scheme**		
Lectures	03 Hrs/Week		**MSE**	20	
Tutorials	00 Hrs/Week		**ISE**	20	
Total Credits	03		**ESE**	60	
			Duration of ESE	02:30 Hrs	

Prerequisite:

Course Outcomes (CO):

Students will be able to

1.	Understand the significance of calibration in maintaining measurement accuracy and traceability.
2.	Calculate the range and sensitivity of analog and digital meters based on their design parameters.
3.	Explain the functions and features of vertical and horizontal deflection systems in oscilloscopes.
4.	Develop the skills to select and configure appropriate bridge circuits for different measurement requirements.
5.	Choose and Compute, selection criteria and applications of various transducers used in measurement systems

	Course Contents	CO	Hrs
Unit 1	**Errors in Measurement and instrument classification.** –Errors-Types of Errors-Statistics of errors, Need for calibration. Classification of instruments, secondary instruments–indicating, integrating and recording operating forces - essentials of indicating instruments - deflecting, damping, controlling torques.	CO1	(06)
Unit 2	**Analog measurements:** Ammeters and voltmeters - permanent magnet moving coil (PMMC), moving iron (MIC), constructional details and operation, principles shunts and multipliers – extension of range.	CO2	(07)
Unit 3	**Digital measurements:** Digital Frequency Meter, Circuit for Measurement of Frequency. Resolution in Digital Meter Sensitivity of Digital Meters, Accuracy Specification of Digital Multi-meters, Digital L, C And R Measurements, Digital LCR Meter and Q Meter.	CO2	(07)
Unit 4	**Oscilloscopes**- Principal of operation of general purpose CRO-basics of vertical and horizontal deflection system, sweep generator etc. DSO-Characteristics-Probes and Probing techniques	CO3	(04)
Unit 5	**AC and DC Bridges**: Classification, measurement of low, medium and high resistance- Ammeter voltmeter method (for low and medium resistance)-Kelvin's double bridge (for low resistance), Wheat-stones bridge (for medium resistance), Loss of Charge method (for high resistance). Measurement of self-inductance-Maxwell's Inductance bridge, Measurement of capacitance –Schering's, bridge.	CO4	(08)
Unit 6	**Transducers** - Definition and classification. LVDT, Electromagnetic and Ultrasonic flow meters, Piezoelectric transducers-modes of operation-force transducer, Load cell, Strain gauge **Measurement of Physical Parameters**: Flow Measurement. Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure - High Pressure, Vacuum level, Temperature -Measurements, Data Acquisition Systems.	CO5	(08)
	Total Lectures		**40**

Text Books

1. J. B. Gupta, A course in Electrical & Electronic Measurement & Instrumentation., S K Kataria & Sons
2. Kalsi H. S., Electronic Instrumentation, 3/e, Tata McGraw Hill, New Delhi, 2012

Reference Books

1. Cooper W.D., Modern Electronics Instrumentation, Prentice Hall of India
2. Golding E.W., Electrical Measurements & Measuring Instruments, Wheeler Pub
3. A course in Electrical and electronics measurement and instrumentation by A.K. Sawhney, 2nd Edition by Dhan Patrai..

Useful Links

1. http://nptel.ac.in/courses/112103174/3

DEPT. OF ELECTRONICS & TELECOMMUNICATION ENGG. Board of Studies Year 26-27 GCE, KARAD

2.	https://nptel.ac.in/courses/108/108/108108147/
3.	Open Source Platform: https://www.tinkercad.com/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO 1	3	2	1	1	1	-	-	-	-	-	-	1	2	-
CO2	3	2	2	1	1	-	-	-	-	-	-	-	2	1
CO 3	2	1	1	-	1	-	-	-	-	-	-	-	1	1
CO 4	2	2	2	1	2	-	-	-	-	-	-	-	1	1
CO 5	2	2	1-	1	1	-	-	-	-	-	-	-	1	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember			
Understand	5	5	20
Apply	5	5	10
Analyse	5	5	20
Evaluate	5	5	10
Create	-	-	-
Total	20	20	60

DEPT. OF ELECTRONICS & TELECOMMUNICATION ENGG. ★ GCE, KARAD ★
Board of Studies Year- 26-27

Government College of Engineering, Karad				
First Year (Semester – II) B. Tech. Electronics and Telecommunication Engineering.				
EX3205: Indian Knowledge Systems (MOOC)				
Teaching Scheme			**Examination Scheme**	
Lectures	-		ISE	-
Tutorials	-		ESE	100
Total Credits	02			

Course Outcomes (CO): Students will be able to

CO1	Understand and appreciate the rich heritage that resides in our traditions
CO2	Inculcate an understanding of the mind/voice dynamic and its function in Indian knowledge systems
CO3	Learn to appreciate the need and importance of Sanskrit in getting to the roots of the philosophical concepts
CO4	Being primed for practices that will prepare one for the inner-journey to discover the Self

Course Contents

Student should complete any one of the MOOC course certification of Indian Knowledge System and submit the copy of certificate to Head of Department prior to ESE.

Guidelines:

- Duration for completion of MOOC course certification is minimum 8 Weeks.
- Platform: NPTEL or Swayam
- Assessment Guideline:- End semester evaluation will be based on the score secured in NPTEL or Swayam certification and Presentation conducted by Panel of Faculty members.
- 60% weightage will be given for score secured in NPTEL or Swayam certification and 40% weightage will be given for presentation.
- If students fail to complete the NPTEL or Swayam certification, student can complete it from other platforms with the prior permission of Head of department.

Government College of Engineering, Karad				
First Year (Semester – II) B. Tech. Electronics and Telecommunication Engineering.				
EX 3206- Engineering Physics Laboratory				
Laboratory Scheme:			**Examination Scheme:**	
Practical	2 Hrs/Week		**ISE**	25
Total Credits	1		**ESE**	25

Course Outcomes :	
After the completion of the course, the students will be able to:	
CO1	Verify laws of electrostatic and magneto static experimentally.
CO2	Demonstrate a behavior of light by LASER, Ultrasonic waves and monochromatic light
CO3	Compute required physical quantity from given data. of semiconductor, superconductor, magnetic and dielectric materials
CO4	Demonstrate recent synthesis methods for engineering and technology.

	Course Contents	**CO**
Experiment1	To study the volt-ampere characteristics of pn-junction and Zener diode, voltage regulator using Zener diode	**CO1, CO3**
Experiment2	To determine the velocityofultrasonic wavesinliquidmediumbyinterferometer.	**CO2, CO4**
Experiment3	Findanobject byUltrasonicwaves	**CO2, CO4**
Experiment4	To calculate the divergenceofLASERbeam.	**CO2, CO4**
Experiment5	DeterminationofwavelengthofLASERusingdiffractiongrating.	**CO2, CO4**
Experiment6	To study magneto resistance of n-type semiconductor	**CO1, CO3**
Experiment7	To study HalleffectinSemiconductor	**CO1, CO3**
Experiment8	To determine theenergygapinsemiconductor by four probe method	**CO1, CO3**
Experiment 9	TostudyFundamental ofSolar Energytrainer/WindenergyTrainer	**CO2, CO4**
Experiment10	To study fundamentals of fiber optics using fiber optics trainer	**CO2, CO4**
Experiment 11	To understand the reconstruction of hologram by Holography	**CO2, CO4**
Experiment12	To determine the magnetic susceptibility of the FeCl3 solution.	**CO1, CO3**
Experiment13	To verify Faradays Law	**CO1**
Experiment14	To verify Lenz's law	**CO1**
	Demonstration Experiment	
Experiment15	TosynthesizeNanoparticlesbysprayPyrolysis/CVDmethod	**CO4**
Experiment16	Tostudybehaviorofmaterial withtemperaturebyTGA/DTA.	**CO4**

List of Submission:	
1.	Minimum number of Experiments: 10

Mapping of COs and Pos:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	3	3	1	-		1	1	-	1	-	2	-	-	-
CO 2	3	3	1	-	-	1	1	-	1	-	2	-	-	-
CO 3	3	3	1	-	-	1	1	-	1	-	2	-	-	-
CO 4	3	3	1	-	-	1	1	-	1	-	2	-	-	-

1: Slight(Low) 2: Moderate(Medium) 3: Substantial(High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	
ISE											25

Government College of Engineering, Karad				
First Year (Sem – II) B. Tech. Electronics and Telecommunication Engineering				
EX3207: Data structure with C++				
Laboratory Scheme:			**Examination Scheme:**	
Lectures	2 Hrs/Week		**ISE**	50
Practical	2 Hrs/Week		**ESE**	50
Total Credits	3			
Prerequisite: Nil				
Course Outcomes (CO):				
Students will be able to				
1.	Demonstrate ability in writing C++ programs using the correct syntax and language features.			
2.	Design and implement object-oriented programs using classes, objects, and inheritance.			
3.	Apply effectively exception and error handling techniques to ensure the reliability and robustness of programs.			
4.	Develop modular and reusable code by applying good coding practices and design principles.			

	Course Contents	Hrs
Unit 1	**Object Oriented Programming:** Object oriented programming paradigm, Concepts of object-oriented programming. Applications of OOP. Beginning with C++: simple program and its structure, Defining Class & its structure,	**(03)**
Unit 2	**Array and Function:** Array of objects, passing objects to functions, returning object, Function, Friend function, friend class, public, private, Copy Constructor.	**(05)**
Unit 3	**Inheritance:** Protected inheritance, Single inheritance, Multiple and multilevel inheritance, Hybrid inheritance, Abstract class, Virtual base class.	**(06)**
Unit 4	**Sequential Representation of Linear data structure:** Definitions, representation, priority queues, operations and their applications. Searching and Sorting Techniques, Linear search, Binary search, Bubble sort, insertion sort.	**(04)**
Unit 5	**Linked Representation of Linear data structure:** Definition, Representation, Operations and Applications of singly linked list, doubly linked list.	**(05)**
Unit 6	**Non-linear data structure (Trees):** Binary Tree, Traversal methods, Binary search tree, B tree.	**(05)**
Experiment 1	Implementation of class objects, constructor, destructor.	CO1
Experiment 2	Implementation of friend function and friend class.	CO1
Experiment 3	Implementation of single inheritance.	CO1
Experiment 4	Implementation of Multiple and multilevel inheritance.	CO3
Experiment 5	Implementation of Abstract class, Virtual base class.	CO2,
Experiment 6	Write a program that implement Queue (its operations) using i) Arrays ii) Linked list (Pointers).	CO2' CO3
Experiment 7	Write a program that implements the following sorting i) Bubble sort ii) Selection sort	CO2 CO4
Experiment 8	Queue ADT using array.	CO1, CO3
Experiment 9	Write a program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree.	CO3 CO4
Experiment 10	Write a program to implement the tree traversal methods	CO3 CO4
List of Submission:		

1.	Minimum number of Experiments: 10

Mapping of COs and Pos:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	3	-	3	1	1	-	-	-	-	-	-	1	1	
CO 2	2	3	3	2	-	-	-	-	-	-	-	3	3	1
CO 3	2	3	3	3	2	-	-	-	-	-	-	3	3	1
CO 4	-	1	-	2	2	-	1	-	-	-	-	1	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	
ISE	25	25	25	25	25	25	25	25	25	25	

Government College of Engineering, Karad				
First Year (Sem – II) B. Tech. Electronics and Telecommunication Engineering				
EX3209: National Cadet Corps				
Teaching Scheme			**Examination Scheme**	
Lectures	04 Hrs/Week		**MSE**	
Tutorials	-		**ISE**	50
Total Credits	1		**ESE**	
			Duration of ESE	

Prerequisite: Nil

Course Outcomes (CO): Students will be able to

1.	Develop sense of discipline, character, and brotherhood, the spirit of adventure and ideals of selfless service.
2.	Understand grace and dignity in the performance of foot drill.
3.	Understand the importance of a weapon its detailed safety precautions necessary for prevention of accidents.
4.	Develop awareness about different types of terrain and how it is used in battle craft.

	Course Contents	CO
Unit 1	Following list of topics and practical's are to be covered during NCC training sessions. • National Integration & Awareness • Personality Development and Leadership • Disaster Management • Social Awareness & Community Development • Health & Hygiene • Environment Awareness and Conservation • Drill • Weapon Training • Adventure Training • Introduction to Armed Forces • Obstacle Training • Military History • Introduction to Infantry Weapons and Equipment • Communication • Map reading • Field Craft and Battle Craft	CO1, CO2, CO3, CO4,
	Min. 75% attendance is mandatory. NCC training will start in Semester I	
	Eligibility Criteria for NCC certificate A Exam 1. The Cadet must have attended a minimum of 75% of total training periods laid down in the syllabus for the first and second years of Junior Division/Wing NCC (All Wings). 2. In order to count his previous tenure, the break in the NCC Training Tenure of the cadet prior to his appearing in the exam should not exceed more than 12 months at one time. 3. In case the break exceeds 12 months the following procedure will be followed :- 1. A. If he has been on the unit rolls for a minimum of two years before his discharge and had attended 75% of the total periods during his NCC Tenure he will need another 36 periods of training to become eligible to appear for Certificate A examination. 2. B. In all other cases, where above conditions are not fulfilled,	

	periods of the first and second years of training. 4. Must have attended one Annual Training Camp. 5. NCC training activity will be covered in Semester I & II.	
Text Books		
1.	"Cadet Hand Book" published by Directorate General of NCC, New Delhi under the Ministry of Defence, Govt. Of India.	
2.	"NCC Red Book", published by Directorate General of NCC, New Delhi under the Ministry of Defence, Govt. of India.	
Reference Books		
1.	"NCC Coffee Table Book", published by Directorate General of NCC, New Delhi under the Ministry of Defence, Govt. of India.	
Useful Links		
1.	https://indiancc.nic.in/	
2.	https://indiancc.mygov.in/	

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1						2		2	1					1
CO 2									2					
CO 3								1	1					
CO 4									1					1

Assessment Pattern:

Marks obtained in NCC certificate 'A' exam will be converted into equivalent In-Semester Evaluation marks. Certificate A exam will be conducted by National Cadet Corps.

Government College of Engineering, Karad				
First Year (Sem – II) B. Tech. Electronics and Telecommunication Engineering				
EX3209: National Service Scheme (NSS)				
Teaching Scheme			**Examination Scheme**	
Lectures	00 Hrs/Week		ISE	50
Practical	02 Hrs/Week		ESE	-
Total Credits	01			

Course Outcomes (CO): Students will be able to

1.	Understand the community in which they work and the relation
2.	Identify the needs and problems of the community and involve them in problem-solving
3.	Develop capacity to meet emergencies and natural disasters
4.	Practice national integration and social harmony.
5.	Utilize their knowledge in finding practical solutions to individual and community problems.

	Course Contents		CO	Hrs
	National Service Scheme:		**CO1,C O2,C O3,C O4,C O5**	(30)
	The NSS activities and allotted hours are mentioned below:			
	1. Blood donation Camp	8 Hrs.		
	2. Tree Plantation	4 Hrs.		
	3. Internal Cleanliness Drive	8 Hrs.		
	4. External Cleanliness Drive	8 Hrs		
	5. Arranging Lectures on Social Issues in schools or villages	4 Hrs.		
	6. Demonstration of Street Plays on Social issues	4 Hrs.		
	7. Demonstration of Street Plays on Safety issues	4 Hrs.		
	8. Arranging Rally on Social issues (Anti-Tobacco, Vysan Mukti etc.).	4 Hrs		
	9. Celebration of National Days (As per NSS list)	4 Hrs.		
	10. Arrangement of free medical checkup camp in villages	4 Hrs.		
	11. Arrangement of environment protection awareness camp	4 Hrs.		
	12. Arrangement of veterinary awareness camp	4 Hrs.		
	13. Participation in disaster management training	8 Hrs.		
	14. Arrangement of water conservations awareness camp	8 Hrs.		
	15. Arrangement of rain water harvesting awareness camp	8 Hrs.		
	16. Assisting local administration for law and order, regulation, social issues.	8 Hrs.		
	17. Any other activity as decided by Hon. Principal / Program Officer from time to time .	8 Hrs		
	Instructions: 1) The Students will have to complete for a total period of 30 hours activities (in one Semester) **OR** Participation in seven days residential camp with completion certificate of NSS camp. 2) NSS Volunteer has to complete 30 hours NSS activities mentioned in above curriculum. NSS volunteer has to prepare and submit NSS activity report of 30 hours to NSS Coordinator. 3) The In Sem Evaluation (ISE) will be conducted by NSS Coordinator based on the attendance, overall performance and the report.			

Reference Books:

1.	NationalServiceSchemeManual,GovernmentofIndia.
2.	TrainingProgrammeonNationalProgrammescheme,TISS.
3.	OrientationCoursesforN.S.S.Programmeofficers,TISS.
4.	CasematerialasTrainingAidforfieldworkers,*GurmeetHans*.
5.	[illegible]

6.	SocialProblemsinIndia,*RamAhuja.*
7.	National Service Scheme Manual (Revised), 2006 Government of India, Ministry of Youth Affairs and Sports, New Delhi.
8.	University of Mumbai National Service Scheme Manual, 2009
9.	Avhan Chancellor's Brigade - NSS Wing, Training Camp on Disaster Preparedness Guidelines, March, 2012.
10.	Rashtriya Seva Yojana Sankalpana - Prof. Dr. Sankey Chakane, Dr. Pramod / Pabrekar, Diamond Publication, Pune.
11	National Service Scheme Manual for NSS District Coordinators, National Service Scheme Cell, Dept. of Higher and Technical Education, Mantralaya.
12	Annual Report of National Service Scheme (NSS) published by Dept. of Higher and Technical Education, Mantralaya.
13	NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA - Socio and Cultural Guidelines.
14	Purushottam Sheth, Dr. Shailaja Mane, National Service Scheme
Useful Links	
1.	https://www.youtube.com/watch?v=3o40NbNLoWQ
2.	https://www.youtube.com/watch?v=paJK5X6zqI8&list=PLp4YWOW_llESHogw-coZo7PQdYliF-msj
3.	https://www.youtube.com/watch?v=paJK5X6zqI8&list=PLp4YWOW_llESHogw-coZo7PQdYliF-msj&index=1

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	1	1	-	-	-	1	1	1	1	-	-	1	1	1
CO 2	1	1	-	-	-	1	1	1	1	-	-	1	1	1
CO 3	1	1	-	-	-	1	1	1	1	-	-	1	1	1
CO 4	1	1	-	-	-	1	1	1	1	-	-	1	1	1
CO5	1	1				1	1	1	1			1	1	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	20
Understand	-	-	10
Apply	-	-	10
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	-	-	50

Government College of Engineering, Karad				
First Year (Sem – II) B. Tech. Electronics and Telecommunication Engineering				
EX3209: E-cell				
Teaching Scheme			**Examination Scheme**	
Lectures	00 Hrs/Week		ISE	50
Practical	02 Hrs/Week		ESE	-
Total Credits	01			

Course Outcomes (CO): Students will be able to

1.	Understand various schemes supporting entrepreneurship.
2.	Use various entrepreneurship models.
3.	Identify qualities of entrepreneurs.
4.	Utilizetheirknowledgeinfindingpracticalsolutionstoindividualandcommunityproblems.

	Course Contents	CO	Hrs
	E-Cell Activities: The E-Cell activities and allotted hours are mentioned below: 1. Orientation and Motivation 2. Opportunity assessment 3. Kickstarting the Entrepreneurial campus 4. Business Planning workshops 5. Prototype to commercialization- drafts preparation 6. Market Analytics 7. Team Building 8. Managing funds/ entrepreneurship finance **9.** Social Entrepreneurship locally in the area	**CO1,CO2,CO3,CO4**	**(30)**
	Instructions: 1) The Students will have to complete for a total period of 30 hours activities (in one Semester). 2) The In Sem Evaluation (ISE) will be conducted by Coordinator based on the attendance, overall performance and the report. 3) E- Cell consist of faculty member's act as the facilitator and students as the active members. The student's members for the E-cell will be selected on the basis of their interest and their willingness to work for E-cell voluntarily. E-cell team will prepare an activities mentioned above for the semester.		

Reference Books:

1.	Dr. Gupta and Dr. Srinivasan, Entrepreneurship development in India, 2022.
2.	Vasant Desai, Dynamics of Entrepreneurial Development and Management, 2001.
3.	Sarugadharan and Resia Begum, Women Entrepreneurship; institutional support and problems.
4.	M.W.Deshpande, Entrepreneurship of small Scale Industries.
5.	D.L. Saxon and RW Smilor (eds), The Art and Science of Entrepreneurs.
6.	Venkateshwara Rao and Udai Pareek,(Eds)Developing Entrepreneurship-A Handbook.
7.	Ravi J. Mathai, Rural Entrepreneurship A Frame Work in Development Entrepreneurship –Ahandbook.

Useful Links

1.	https://gpdaman.in/entrepreneurship-development-cell-edc/
2.	https://www.ecell.in/2020/ IIT Bombay.
3.	https://www.ecelliitk.org/ IIT Kanpur

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	1	1	-	-	-	1	1	1	1	-	-	1	1
CO 2	1	1	-	-	-	1	1	1	1	-	-	1	1
CO 3	1	1	-	-	-	1	1	1	1	-	-	1	1
CO 4	1	1	-	-	-	1	1	1	1	-	-	1	1
CO5	1	1				1	1	1	1			1	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	20
Understand	-	-	10
Apply	-	-	10
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	-	-	50

Government College of Engineering, Karad				
First Year (Sem – II) B. Tech. Electronics and Telecommunication Engineering				
EX3209: Community Service and Practices (CSP)				
Teaching Scheme			**Examination Scheme**	
Lectures	00 Hrs/Week		ISE	50
Practical	02 Hrs/Week		ESE	-
Total Credits	01		Duration of ESE	-

Course Outcomes (CO): After successful completion of course the Students will be able to

CO1	Understand the community needs in which they are living.
CO2	Identify the problems of the community and help to solve them.
CO3	Apply technical knowledge of respective field to train local community.
CO4	Practice national integration and social harmony.

	Course Contents	CO	Hours
	Community Service and Practices (CSP): 1. Student has to register for CSP with department coordinator. 2. He/she has to complete one of the following two modules. 3. He/she has to obtain certificate of participation from Head of the department to that effect.		
	MODULE I: The institute has signed MoU with NASSCOM for implementation of digital literacy program (under NDLM - National Digital Literacy Mission). The program shall cover training of school children or village youths on one of the 7 modules designed by NASSCOM such as internet, mobile banking, e-commerce, e-business, use of media like WhatsApp/ linkedin etc. The course details are provided by NASSCOM. The course work of each module consists of presentation of readymade power point slides as a theory and separate practice sessions. The module shall be followed by test and joint certification of successful candidates (institute and NASSCOM). The theory sessions shall be conducted in the respective schools and the practical may be conducted in schools subject to availability of computational facility OR in the computer centre of our institute on weekend. The total duration of the course shall be between 40 to 60 hours. The students shall visit schools covering 20 km surrounding area (rural and municipal schools) and register the school students. The target for each student shall be delivery and certification of one of the modules to a group of 6 school students. Travelling allowance for travel by bus (bus ticket) or sleeper class shall only be admissible to the students at actual subject to prior sanction of Hon. Principal for the activity.	**CO1, CO2, CO3, CO4**	40 to 60
	MODULE II He/she should participate in all/few of the following activities and complete at least 60 hours of activities for technology transfer to community within 20 km. The activities shall be declared by respective Head of the department. The list of different CSP activities to be conducted under this module shall be but not limited to the following. The activity has to be conducted under the institute banner and counting of its equivalent duration shall be as Indicated against each. He/she should collect total 60 Hours from CSP activities. 1. Two wheeler maintenance 16 Hrs. 2. Motor cycle repairing 16 Hrs. 3. Electrical wiring 16 Hrs. 4. Plumbing 16 Hrs. 5. Carpentry 16 Hrs. 6. Computer Hardware maintenance 16 Hrs.	**CO1, CO2, CO3, CO4**	60

	7. Radio / T.V. repair 16 Hrs. 8. Rain water harvesting 16 Hrs. 9. Roof water harvesting 16 Hrs. 10. Electric safety 16 Hrs. 11. Electrical Safety 16 Hrs. 12. Constructional Safety 16 Hrs.		

Reference Books:

1.	Community Service and Practices Manual, Government of India.
2.	Training Programme on National Programme scheme, TISS.
3.	Case material as Training Aid for field workers, *Gurmeet Hans.*
4.	Social service opportunities in Hospitals, *Kapil K.Krishan,*TISS.
5.	Social Problems in India, *Ram Ahuja.*
6.	National Service Scheme Manual (Revised), 2006 Government of India, Ministry of Youth Affairs and Sports, New Delhi.
7.	University of Mumbai National Service Scheme Manual, 2009
8.	Avhan Chancellor's Brigade - NSS Wing, Training Camp on Disaster Preparedness Guidelines, March, 2012.
9.	Rashtriya Seva Yojana Sankalpana - Prof. Dr. Sankey Chakane, Dr. Pramod / Pabrekar, Diamond Publication, Pune.
10.	National Service Scheme Manual for NSS District Coordinators, National Service Scheme Cell, Dept. of Higher and Technical Education, Mantralaya.
11	Annual Report of National Service Scheme (NSS) published by Dept. of Higher and Technical Education, Mantralaya.
12	NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA - Socio and Cultural Guidelines.
13	Purushottam Sheth, Dr. Shailaja Mane, National Service Scheme

Useful Links

1.	https://www.youtube.com/watch?v=3o40NbNLoWQ
2.	https://www.youtube.com/watch?v=paJK5X6zqI8&list=PLp4YWOW_llESHogw-coZo7PQdYliF-msj
3.	https://www.youtube.com/watch?v=paJK5X6zqI8&list=PLp4YWOW_llESHogw-coZo7PQdYliF-msj&index=1

Mapping of COs and POs

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1		1	-	-	-		1	1		1	-	1	1	1
CO 2	1	1	-	-	-	1	1	1	1	1	-	1	1	1
CO 3	1	1	-	-	-	2	1	1	1	1	-	1	1	1
CO 4	1	1	-	-	-	1	1	1	1	1	-	1	1	1
CO5	1	1				1		1	1			1	1	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	10
Understand	-	-	10
Apply	-	-	20
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	-	-	50

Government College of Engineering, Karad				
First Year (Sem- II) B. Tech Electronics and Telecommunication Engineering				
MS3212: Makers Space Laboratory II				
Laboratory Scheme			**Examination Scheme**	
Practical	04 Hrs/week		**ISE**	**50**
			ESE	**50**
Total Credits	02			

Prerequisite: Makers Space Laboratory I

Course Outcomes (CO): Students will be able to

CO1	Apply engineering knowledge to execute multidisciplinary projects.
CO2	Demonstrate effective teamwork and engineering management skills.
CO3	Develop and implement real-world engineering solutions.
CO4	Analyze and solve practical engineering problems using multidisciplinary approaches.

Course Contents

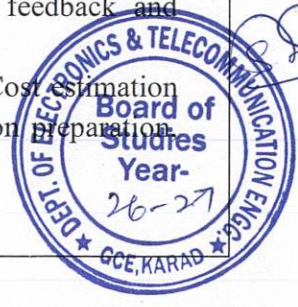
The main aim of this course is to develop among students the essential qualities of creativity, innovation, critical thinking, collaborative learning, leadership, and engineering problem-solving skills through hands-on multidisciplinary projects and prototype development.

Students shall work in groups consisting of a maximum of FIVE students. The groups are encouraged to be multidisciplinary and may include students from different engineering branches. Each group shall identify a real-life or societal problem and develop an innovative technological solution in the form of a prototype, model, system, software, process, or product.

The developed solution must demonstrate novelty, practical utility, sustainability, and engineering application.

The steps involved in completion of the project shall include, but are not limited to:

1. **Problem Identification and Need Analysis:** Through, Observation of day-to-day problems, Field visits and surveys, Literature review, Interaction with users/community, Identification of societal, environmental, industrial, or technological challenges
2. **Ideation and Concept Development:** Including, Brainstorming and idea generation, Design thinking methodologies, Feasibility analysis, Conceptual design and workflow preparation, Selection of suitable materials/components/tools
3. **Design and Prototype Development:** Engineering design and planning, CAD modeling/sketching/block diagrams, Fabrication and assembly, Programming and system integration, Sensor interfacing and automation, Development of software/hardware systems, Testing of subsystems
4. **Testing, Validation and Improvement:** Prototype testing and debugging, Performance evaluation, Validation through experimentation, User feedback and modifications Optimization and refinement
5. **Presentation and Documentation:** Preparation of technical report, Cost estimation and feasibility study, Prototype demonstration, Poster and presentation preparation, Final viva and exhibition



Task	Activity
Task 1	Introduction to multidisciplinary project development, team formation, identification of societal and industrial problem statements.
Task 2	Literature survey, problem analysis, brainstorming sessions, and selection of project theme.
Task 3	Requirement analysis, preparation of functional block diagram, project planning, and task allocation among team members.
Task 4	Conceptual design development, selection of components, feasibility analysis, and preparation of preliminary design report.
Task 5	Mechanical system design, CAD modeling, and structural planning of the proposed system.
	Electrical and electronic subsystem design including sensors, actuators, power supply, and interfacing circuits.
	Embedded system development, microcontroller programming, communication protocol implementation, and software architecture design.
	Procurement of components, fabrication planning, PCB preparation, and hardware assembly initiation.
	Prototype fabrication, subsystem integration, wiring, assembly, and implementation of software modules.
Task 6	Testing of individual modules, debugging, calibration, troubleshooting, and validation of subsystem functionality.
Task 7	Complete system integration, multidisciplinary coordination, and implementation of automation or IoT features.
Task 8	Performance evaluation, optimization, testing under different operating conditions, and reliability assessment.
Task 9	Preparation of technical documentation, project report, presentation slides, posters, and student portfolio compilation.
Task 10	Final project demonstration, viva voce examination, prototype exhibition, and evaluation by faculty/industry experts.

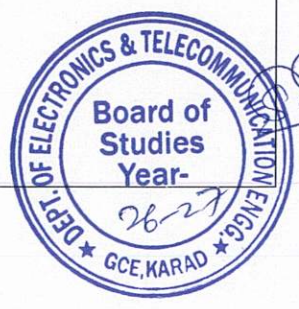
Experiment Completion Reports Each

experiment report shall contain:

1. Project Title
2. Domain Introduction
3. Motivation
4. Design Methodology
5. Implementation and Mod eling
6. Testing and Development
7. Conclusion
8. Reference
9. Presentation
10. Viva Questions

Maker Lab II – Common Multidisciplinary Project

Project Themes



1. **Industry 4.0**
2. **Smart Agriculture**
3. **Smart Energy Systems**
4. **Smart Campus**
5. **Sustainable Infrastructure**
6. **Healthcare Devices**
7. **Robotics and Automation**
8. **Smart Transportation**
9. **Disaster Management Systems**

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 1	PSO 1	PSO 2
CO1	3	2	3	2	2	1	1	--	2	1	1	2	1	
CO2	1	1	1	1	1	1	1	2	3	3	3	3	1	
CO3	3	3	3	3	2	2	2	1	2	2	2	3	1	
CO4	3	3	2	3	2	1	2	1	2	1	1	3	1	

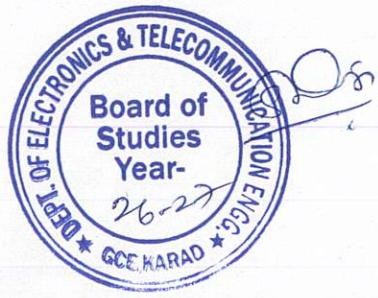
Guideline for Assessment Pattern **(with revised Bloom's Taxonomy)**

Rubrics for Practical Evaluation

Criteria	Excellent	Good	Average	Poor
Preparation	4	3	2	1
Technical Execution	4	3	2	1
Safety Practices	4	3	2	1
Observation and Analysis	4	3	2	1
Documentation	4	3	2	1

Rubric-Based Evaluation Sheet

Evaluation Parameter	Max Marks	Obtained	Remarks
Preparation	10		
Execution	10		
Observation	10		
Documentation	10		
Viva	10		
Total	**50**		



Evaluation Scheme

Knowledge Level	ISE	ESE
Remember	-	-
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10
TOTAL	50	50

