Semester : Second

Sr No	Course Title	Abbrevation	Course Type	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Assessment Scheme												
						Actual Contact Hrs./Week			Self Learning (Activity/ Assignment /Micro Project)	Notional Learning Hrs /Week		Paper Duration (hrs.)	Theory				Based on LL & TL				Based on Self Learning		Total Marks
																	Practical						
													FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
						CL	TL	LL					Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
General (General) Compulsory - 7																								
1	APPLIED MATHEMATICS	AMS	AEC	312301	2	3	1	-	-	4	2	3	30	70	100	40	-	-	-	-	-	-	100
2	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	BEE	AEC	312302	0	4	-	4	2	10	5	1.5	30	70*#	100	40	50	20	50@	20	50	20	250
3	PROGRAMMING IN C	PIC	AEC	312303	0	4	-	4	2	10	5	3	30	70	100	40	50	20	50#	20	25	10	225
4	LINUX BASICS	BLP	DSC	312001	0	2	-	2	-	4	2	-	-	-	-	-	25	10	25@	10	-	-	50
5	PROFESSIONAL COMMUNICATION	PCO	SEC	312002	0	-	-	2	-	2	1	-	-	-	-	-	25	10	25@	10	-	-	50
6	SOCIAL AND LIFE SKILLS	SFS	VEC	312003		-	-	1	1	2	1	-	-	-	-	-	25	10	-	-	25	10	50
7	WEB PAGE DESIGNING	WPD	SEC	312004		2	-	4	2	8	4	-	-	-	-	-	50	20	50@	20	25	10	125
Total					**2**	**15**	**1**	**17**	**7**	**40**	**20**		**90**	**210**	**300**		**225**		**200**		**125**		**850**

Abbreviations : CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends : @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :
1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
Course Category : Discipline Specific Course Core (DSC) : 1, Discipline Specific Elective (DSE) : 0, Value Education Course (VEC) : 1, Intern./Apprenti./Project./Community (INP) : 0, AbilityEnhancement Course (AEC) : 3, Skill Enhancement Course (SEC) : 2, GenericElective (GE) : 0

Programme Name/s	**: Architecture Assistantship/ Automobile Engineering./ Artificial Intelligence/ Agricultural Engineering/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Architecture/ Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Computer Hardware & Maintenance/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Instrumentation/ Interior Design & Decoration/ Interior Design/ Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Medical Electronics/ Production Engineering/ Electronics & Computer Engg./**
Programme Code	**: AA/ AE/ AI/ AL/ AN/ AO/ AT/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DE/ DS/ EE/ EJ/ EP/ ET/ EX/ HA/ IC/ IE/ IF/ IH/ IS/ IX/ IZ/ LE/ ME/ MK/ MU/ PG/ TE/**
Semester	**: Second**
Course Title	**: APPLIED MATHEMATICS**
Course Code	**: 312301**

I. RATIONALE

An Applied Mathematics course, covering integration, definite integration, differential equations, numerical methods, and probability distribution, equips engineering students with essential problem-solving tools. It enables them to model and analyze complex systems, make informed decisions and address real-world engineering challenges effectively.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Engineers applying Mathematics should proficiently solve complex real-world problems, enhancing decision-making, design and innovation with precision and efficiency.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Solve the broad-based engineering problems of integration using suitable methods.
- CO2 - Use definite integration to solve given engineering related problems.
- CO3 - Apply the concept of differential equation to find the solutions of given engineering problems.
- CO4 - Employ numerical methods to solve programme specific problems.
- CO5 - Use probability distributions to solve elementary engineering problems.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
312301	APPLIED MATHEMATICS	AMS	AEC	3	1	-	-	4	2	3	30	70	100	40	-	-	-	-	-	-	100

Total IKS Hrs for Sem. : 2 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Solve the given simple problem(s) based on rules of integration. TLO 1.2 Evaluate the given simple integral(s) using substitution method. TLO 1.3 Integrate given simple functions using the integration by parts. TLO 1.4 Solve the given simple integral by partial fractions.	**Unit - I Indefinite Integration** 1.1 Simple Integration: Rules of integration and integration of standard functions 1.2 Integration by substitution. 1.3 Integration by parts. 1.4 Integration by partial fractions (only linear non repeated factors at denominator of proper fraction).	Improved Lecture Demonstration Chalk-Board Presentations Video Demonstrations
2	TLO 2.1 Solve given examples based on Definite Integration. TLO 2.2 Use properties of definite integration to solve given problems.	**Unit - II Definite Integration** 2.1 Definite Integration: Definition, rules of definite integration with simple examples. 2.2 Properties of definite integral (without proof) and simple examples.	Video Simulation Chalk-Board Improved Lecture Presentations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Find the order and degree of given differential equations. TLO 3.2 Form simple differential equation for given elementary engineering problems. TLO 3.3 Solve given differential equations using the methods of Variable separable and Exact Differential Equation(Introduce the concept of partial differential equation). TLO 3.4 Solve given Linear Differential Equation.	**Unit - III Differential Equation** 3.1 Concept of Differential Equation. 3.2 Order, degree and formation of Differential equations 3.3 Methods of solving differential equations: Variable separable form, Exact Differential Equation, Linear Differential Equation.	Video Demonstrations Presentations Chalk-Board Improved Lecture Flipped Classroom
4	TLO 4.1 Find roots of algebraic equations by using appropriate methods. TLO 4.2 Solve the system of equations in three unknowns by iterative methods. TLO 4.3 Solve problems using Bakhshali iterative method for finding approximate square root. (IKS)	**Unit - IV Numerical Methods** 4.1 Solution of algebraic equations: Bisection method, Regula falsi method and Newton –Raphson method. 4.2 Solution of simultaneous equations containing three Unknowns by iterative methods: Gauss Seidal and Jacobi's method. 4.3 Bakhshali iterative method for finding approximate square root. (IKS)	Video SCILAB Spreadsheet Chalk-Board Flipped Classroom Presentations
5	TLO 5.1 Solve given problems based on repeated trials using Binomial distribution. TLO 5.2 Solve given problems when number of trials are large and probability is very small. TLO 5.3 Utilize the concept of normal distribution to solve related engineering problems.	**Unit - V Probability Distribution** 5.1 Binomial distribution. 5.2 Poisson's distribution. 5.3 Normal distribution.	Video ORANGE Chalk-Board Improved Lecture Presentations

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Solve simple problems of Integration by substitution	1	*Integration by substitution	1	CO1
LLO 2.1 Solve integration using by parts	2	*Integration by parts	1	CO1
LLO 3.1 Solve integration by partial fractions(only linear non repeated factors at denominator of proper fraction).	3	Integration by partial fractions.	1	CO1
LLO 4.1 Solve examples on Definite Integral based on given methods.	4	Definite Integral based on given methods.	1	CO2
LLO 5.1 Solve problems on properties of definite integral.	5	*Properties of definite integral	1	CO2

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 6.1 Solve given problems for finding the area under the curve and volume of revolution.	6	* #Area under the curve and volume of revolution.(Only for Civil and Mechanical Engineering Group)	1	CO2
LLO 7.1 Solve examples on mean value and root mean square value.	7	* #Mean value and root mean square value. (Only for Computer, Electrical and Electronics Engineering Group)	1	CO2
LLO 8.1 Solve examples on order, degree and formation of differential equation.	8	Order, degree and formation of differential equation.	1	CO3
LLO 9.1 Solve first order first degree differential equation using variable separable method.	9	Variable separable method.	1	CO3
LLO 10.1 Solve first order first degree differential equation using exact differential equation and linear differential equation.	10	*Exact differential equation and linear differential equation.	1	CO3
LLO 11.1 Solve engineering application problems using differential equation.	11	*Applications of differential equations.(Take programme specific problems)	1	CO3
LLO 12.1 Solve problems on Bisection method and Regula falsi method.	12	*Bisection method and Regula falsi method.	1	CO4
LLO 13.1 Solve problems on Newton-Raphson method.	13	Newton- Raphson method.	1	CO4
LLO 14.1 Solve problems on Jacobi's method and Gauss Seidal Method.	14	Jacobi's method and Gauss Seidal Method.	1	CO4
LLO 15.1 Use Bakhshali iterative methods for finding approximate value of square root. (IKS)	15	*Bakhshali iterative methods for finding approximate value of square root. (IKS)	1	CO4
LLO 16.1 Solve engineering problems using Binomial distribution.	16	*Binomial Distribution	1	CO5
LLO 17.1 Solve engineering problems using Poisson distribution.	17	*Poisson Distribution	1	CO5
LLO 18.1 Solve engineering problems using Normal distribution.	18	Normal Distribution	1	CO5
LLO 19.1 Solve problems on Laplace transform and properties of Laplace transform.	19	* # Laplace transform and properties of Laplace transform.(Only for Electrical and Electronics Engineering Group)	1	CO2
LLO 20.1 Solve problems on Inverse Laplace transform and properties of Inverse Laplace transform.	20	* # Inverse Laplace transform and properties of Inverse Laplace transform.(Only for Electrical and Electronics Engineering Group)	1	CO2

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING /

SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- NA

Assignment

- NA

Note :
NA

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Open-source software like wolfram alpha, SageMaths, MATHS3D, GeoGebra, Graph, DPLOT, and Graphing Calculator (Graph Eq2.13), ORANGE can be used for Algebra, Calculus, Trigonometry and Statistics respectively.	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Indefinite Integration	CO1	15	2	6	12	20
2	II	Definite Integration	CO2	8	2	4	6	12
3	III	Differential Equation	CO3	8	2	4	6	12
4	IV	Numerical Methods	CO4	6	2	4	8	14
5	V	Probability Distribution	CO5	8	2	4	6	12
Grand Total				**45**	**10**	**22**	**38**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Tests

Summative Assessment (Assessment of Learning)

- End Term Exam

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	1	-	-	1	-	1			
CO2	3	1	-	-	1	-	1			
CO3	3	2	1	1	1	1	1			
CO4	2	3	2	2	1	1	1			
CO5	2	2	1	1	2	1	2			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Grewal B. S.	Higher Engineering Mathematics	Khanna publication New Delhi, 2013 ISBN: 8174091955
2	Dutta. D	A text book of Engineering Mathematics	New age publication New Delhi, 2006 ISBN: 978- 81-224-1689-3
3	Kreysizg, Ervin	Advance Engineering Mathematics	Wiley publication New Delhi 2016 ISBN: 978-81- 265-5423-2
4	Das H.K.	Advance Engineering Mathematics	S Chand publication New Delhi 2008 ISBN: 9788121903455
5	S. S. Sastry	Introductory Methods of Numerical Analysis	PHI Learning Private Limited, New Delhi. ISBN-978-81-203-4592-8
6	C. S. Seshadri	Studies in the History of Indian Mathematics	Hindustan Book Agency (lndia) P 19 Green Park Extension New Delhi. ISBN 978-93-80250-06-9
7	Marvin L. Bittinger David J.Ellenbogen Scott A. Surgent	Calculus and Its Applications	Addison-Wesley 10th Edition ISBN-13: 978-0-321-69433-1
8	Gareth James, Daniela Witten,Trevor Hastie Robert andTibshirani	An Introduction to StatisticalLearning with Applications in R	Springer New York Heidelberg Dordrecht LondonISBN 978-1-4614-7137-0 ISBN 978-1-4614-7138-7 (eBook)

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	http://nptel.ac.in/courses/106102064/1	Online Learning Initiatives by IITs and IISc
2	https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig	Concept of Mathematics through video lectures and notes
3	https://www.wolframalpha.com/	Solving mathematical problems, performing calculations, and visualizing mathematical concepts.

Sr.No	Link / Portal	Description
4	http://www.sosmath.com/	Free resources and tutorials
5	http://mathworld.wolfram.com/	Extensive math encyclopedia with detailed explanations of mathematical concepts
6	https://www.mathsisfun.com/	Explanations and interactive lessons covering various math topics, from basic arithmetic to advanced
7	http://tutorial.math.lamar.edu/	Comprehensive set of notes and tutorials covering a wide range of mathematics topics.
8	https://www.purplemath.com/	Purplemath is a great resource for students seeking help with algebra and other foundational mathematics to improve learning.
9	https://www.brilliant.org/	Interactive learning in Mathematics
10	https://www.edx.org/	Offers a variety of courses
11	https://www.coursera.org/	Coursera offers online courses in applied mathematics from universities and institutions around the globe.
12	https://ocw.mit.edu/index.htm	The Massachusetts Institute of Technology (MIT) offers free access to course materials for a wide range of mathematical courses.

Programme Name/s	**: Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Cloud Computing and Big Data/ Computer Technology/ Computer Engineering/ Computer Science & Engineering/ Data Sciences/ Computer Hardware & Maintenance/ Information Technology/ Computer Science & Information Technology**
Programme Code	**: AI/ AN/ BD/ CM/ CO/ CW/ DS/ HA/ IF/ IH**
Semester	**: Second**
Course Title	**: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
Course Code	**: 312302**

I. RATIONALE

Diploma engineers have to deal with electrical and electronic systems. Modern engineering systems, irrespective of the field, are increasingly incorporating smart technologies that rely on electrical and electronic components. A well-rounded education in electrical and electronics principles enables engineers to work seamlessly across disciplines. Electrical and Electronics Engineering forms the foundation for understanding the hardware components of computer systems. This knowledge is crucial for students in computer science as it helps them comprehend how computers process and store information at the hardware level. This course is designed with basic information to help students apply basic concepts, rules, and safety rules of electrical engineering and electronic engineering and perform practicals thereof.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

This course is to be taught and implemented with the aim to develop in the student, the course outcomes (COs) leading to the attainment of following industry identified outcomes expected from this course: Apply basic concept of electrical and electronics engineering in various applications in relevent technical fields.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Calculate and measure basic electrical quantities and parameters.
- CO2 - Use different electrical machines by making connections.
- CO3 - Use electrical safety devices in electrical circuit
- CO4 - Use relevant diode in different electronic circuits.
- CO5 - Use BJT and FET in various electronic circuits.
- CO6 - Use various types of sensors and transducers.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
312302	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	BEE	AEC	4	-	4	2	10	5	1.5	30	70*#	100	40	50	20	50@	20	50	20	250

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Apply Faraday's law of electomagnetic induction and Fleming's right hand rule, Lenz's law for induced emf to find its magnitude and direction. TLO 1.2 Differentiate alertnating current (AC) and direct current (DC) TLO 1.3 Explain parameters of single phase AC sinusoidal waveform. TLO 1.4 Describe the silent features of three phase AC supply system. TLO 1.5 Explain star and delta connection in three phase AC system. TLO 1.6 Calculate the phase and line current and voltage in star and delta connections.	**Unit - I Basic Electrical Fundamentals** 1.1 Electric and magnetic circuits. 1.2 Series and parallel magnetic circuits. 1.3 Faraday's laws of electromagnetic induction, Fleming's right hand rule,Lenz's law 1.4 Dynamically and statically induced emf, self and mutual inductance 1.5 AC and DC quantity, advantages of AC over DC supply. 1.6 Single phase AC, sinusoidal AC wave: instantaneous value, cycle, amplitude, time period, frequency, angular frequency, RMS value, Average value for sinusoidal waveform, form factor, peak factor. 1.7 Three phase supply system over single phase supply system, Phase sequence and balanced and unbalanced load 1.8 Star and delta connections, Phase and line current, phase and line voltage in star connected and delta connected balanced system.	Chalk-Board Presentations Demonstration

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Explain the working principle of the given type of transformer. TLO 2.2 Distinguish the construction of the given type of transformer. TLO 2.3 Describe the construction and working of the given type of DC motor. TLO 2.4 Select relevant type of DC motor for the given application with justification TLO 2.5 Explain working principle and operation of Universal motor. TLO 2.6 Describe the procedure to connect stepper motor for the given application with sketches.	**Unit - II Electrical Machines.** 2.1 Transformer: Working principle, emf equation, Voltage ratio, current ratio and transformation ratio, losses. 2.2 DC motor construction - parts its function and material used. 2.3 DC motor -Principle of operation. 2.4 Types of DC motors, schematic diagram, applications of dc shunt, series and compound motors. 2.5 Universal motor: principle of operation, reversal of rotation and applications. 2.6 Stepper motor: types, principle of working and applications.	Chalk-Board Presentations Demonstration
3	TLO 3.1 Describe the characteristics and features of the given type of protective device. TLO 3.2 Select the relevant protective device for the given application with justification TLO 3.3 Select suitable switchgear for the given situation with justification. TLO 3.4 state the I.E. rule related to be applied for the given type of earthing with justifications.	**Unit - III Electrical Safety and Protective Devices.** 3.1 Low rating Fuse: Operation, types 3.2 Switch Fuse Unit and Fuse Switch Unit: Differences, use of multimeter for electrical quantities/ parameters measurements. 3.3 MCB and ELCB/RCB: Operation and general specifications 3.4 Earthing: Types, Importance of earthing, factors affecting eatthing resistance. 3.5 Measures for reducing earth resistance, I.E rules relevant to earthing.	Chalk-Board Demonstration Presentations
4	TLO 4.1 Measure Zener voltage on given V-I characteristics of the Zener diode. TLO 4.2 Explain the working principle of LED. TLO 4.3 Describe the working principle of given type of filter. TLO 4.4 Explain the working principle of regulated power supply and UPS.	**Unit - IV Special purpose diodes and their applications.** 4.1 Zener diode: working, symbol, applications. 4.2 LED: working, symbol, applications. 4.3 Filters: Need for filters, circuit diagram and working of L, C and CLC filter. 4.4 Working principle and block diagram of regulated power supply. 4.5 UPS: Block diagram of Online and Offline UPS.	Chalk-Board Demonstration Assignment

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Describe with sketches the construction and working of the given type of transistors. TLO 5.2 Compare the performance of the given transistor configurations TLO 5.3 Explain applications of transistor as a switch and amplifier. TLO 5.4 Explain with sketches the construction and working of the given type of FET.	**Unit - V Transistors** 5.1 BJT: Types, symbol, construction and working principle of NPN transistor. 5.2 Transistor configurations: CB, CE, CC 5.3 Characteristics of transistor in CE configuration. 5.4 Transistor parameters: alpha, beta and derive relation between them. 5.5 Applications-Transistor as a switch and as an amplifier. 5.6 FET: Types, symbol, construction and working principle of n channel JFET. 5.7 Characteristics of JFET: Drain and Transfer characteristics.	Chalk-Board Demonstration Assignments
6	TLO 6.1 Select relevant transducer for given application. TLO 6.2 Differentiate the features of transducers and sensors for given quantity measurement. TLO 6.3 Explain with sketches the working principle of given type of thermal, optical sensors.	**Unit - VI Sensors and Transducers** 6.1 Sensors and Transducers: Basic definition, difference, classification. 6.2 Thermal, Optical, Electric sensors 6.3 Transducers: Need of transducer, types of transducers: Primary, Secondary, Active, Passive, Analog, Digital 6.4 Selection criteria of transducer	Chalk-Board Demonstration Assignments

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Use electrical meters for measurement of electrical parameters. LLO 1.2 Identify presence of magnetic flux lines.	1	*Measure the parameters of simple electrical and identify presence of flux lines in magnetic circuit.(e.g. current, voltage, power, flux)	2	CO1
LLO 2.1 Interpret the AC waveform for resistive and inductive circuit displayed on CRO.	2	*Measure frequency, time period, rms value, peak value of sinusoidal AC waveform for resistive and inductive circuit using CRO.	2	CO1
LLO 3.1 Measure the phase difference between voltage and current in the AC circuit of the inductive circuit.	3	Phase difference of voltage and current in inductive circuit.	2	CO1
LLO 4.1 Measure the line voltage, phase voltage a, phase current, and line current in three phase star connected balanced load. LLO 4.2 Determine phase voltage and line current relation in star connected load.	4	*Measure the line voltage, phase voltage and phase current and line current in three phase star connected balanced load.	2	CO1
LLO 5.1 Find the phase voltage and line current relation in delta connected load.	5	Measure the line voltage, phase voltage and phase current and line current in three phase delta connected balanced load.	2	CO1
LLO 6.1 Determine the transformation ratio.	6	*Determination of the voltage and current ratio of single phase transformer.	2	CO2

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 7.1 DC shunt motor operation.	7	*Operate DC shunt motor by connecting three point starter.	2	CO2
LLO 8.1 DC series motor operation	8	Operate DC series motor by connecting three point starter	2	CO2
LLO 9.1 Speed reversal of universal motor.	9	*Reverse the direction of rotation of universal motor.	2	CO2
LLO 10.1 Demonstrate stepper motor operation.	10	Demonstrate the operation of stepper motor for various speed rotation.	2	CO2
LLO 11.1 Use of multimeter for measurement.	11	*Use multimeter for measurement of voltage, current (AC,DC), resistance and continuity of the given electrical circuit.	2	CO3
LLO 12.1 Connection of fuses in electrical circuit.	12	Connect fuse in electrical circuit and check its operation at normal and abnormal conditions.	2	CO3
LLO 13.1 Connection of MCB in electrical circuit	13	*Connect MCB in electrical circuit and check its operation at normal and abnormal conditions.	2	CO3
LLO 14.1 Connection of ELCB in electrical circuit.	14	Connect ELCB in electrical circuit and check its operation at normal and abnormal conditions.	2	CO3
LLO 15.1 Measurement of earth resistance.	15	Use of earth tester for meaurement of earthing resistance of a installed earthing of laboratory.	2	CO3
LLO 16.1 Check the forward and reverse bias V-I characteristics of Zener diode.	16	*Connect the Zener diode in the circuit and test its operation in forward and reverse bias mode.	2	CO4
LLO 17.1 Find the voltage regulation of Zener diode.	17	*Determine the voltage regulation by using Zener diode under variable input and output conditions.	2	CO4
LLO 18.1 Filter the ripples by using L, C and pi filter.	18	Check the output waveform of L, C and π filters on CRO of rectifier circuit.	2	CO4
LLO 19.1 Check the operation of UPS under online and offline mode.	19	*Make the input and output connections of UPS and measure the output voltage under online and offline mode.	2	CO4
LLO 20.1 Check the abnormal and normal operation of UPS.	20	*Make the input, output connections and check the operation of UPS under normal and overload condition.	2	CO4
LLO 21.1 Check the operation of NPN transistor under CE configuration.	21	*Test input /output characteristics of NPN transistor in CE configuration.	2	CO5
LLO 22.1 Check the operation of NPN transistor under CB configuration.	22	Test input /output characteristics of NPN transistor in CB configuration.	2	CO5
LLO 23.1 Check operation of transistor for ON and OFF conditions.	23	*Check the switch ON and switch OFF condition of LED by using transistor.	2	CO5
LLO 24.1 Use FET (BFW10) to plot drain and transfer characteristics.	24	Determine the Drain and Transfer characteristics of FET.	2	CO5
LLO 25.1 Use of RTD (PT-100) for measurement of temperature.	25	*Measure temperature of liquid using RTD (PT-100) transducer.	2	CO6
LLO 26.1 Use active transducer (thermocouple) for measurement of temperature.	26	Measure temperature of liquid using thermocouple measurement.	2	CO6

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 27.1 Use of photoelectric sensor to sense motion.	27	Check the motion of given object using photoelectric sensor.	2	CO6
LLO 28.1 Use Passive transducer to measure resistance.	28	*Measure the resistance of LDR in varying light intensity.	2	CO6
LLO 29.1 Use Passive transducer to measure displacement.	29	Measure displacement using LVDT.	2	CO6
LLO 30.1 Use Passive transducer to measure displacement.	30	Measurement of displacement using potentiometer.	2	CO6

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Basic Electrical Engineering:

1) Prepare an electrical circuit comprising of one lamp and switch and measure current of the circuit.
2) Prepare a model of two resistances connected in series and parallel and measure the resistance of both circuits.
3) Prepare a magnetic circuit model to demonstrate magnetic force of line (flux) and check its properties.
4) Prepare a model to demonstrate Faraday's laws of electromagnetic induction.
5) Prepare a model to demonstrate dynamically and statically induced EMF.
6) Prepare a test lamp and check the supply continuity using it.
7) Connect two small battery cells (AA size) make series and parallel connections and measure the voltage of both connections.
8) Visit to supply panel of 3-phase and 1-phase AC supply and identify the supply connection.
9) Prepare star /delta connection model using three filament lamps.
10) Collect a small transformer and make model showing the input and output winding connection.
11) Collect the parts of a small transformer and make a demonstration model.
12) Prepare a demonstration model of DC motor. Collect different types of small rating fuses and make a demonstration chart.
13) Prepare a switchboard containing one switch, one fuse, and one socket and test it.
14) Collect MCB dismantle it and prepare a demonstration model showing actual parts of MCB.

- Basic Electronics Engineering:

1) Transistor: Build a circuit to switch ON and OFF LED using BJT as a switching component.
2) Voltage Regulator: Build a DC regulated power supply circuit on a general purpose PCB for +9V output voltage.
3) Transistor: Build a circuit using transistor to amplify the AC input signal of 200mV.
4) FET: Build a circuit using FET to amplify the AC input signal of 300mV.
5) LDR: Build a circuit of an Automatic street light controller using LDR on general purpose PCB.

Note :

Encourage students to prepare Small models, Sample list of micro projects are given. Teacher can give other microproject concern to course curriculum

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Single Phase Transformer: 1kVA, single-phase, 230/150 V, air cooled	6
2	Single phase auto transformer (Dimmer stat) – 0-230 volt 2/5Amp	6,13
3	CRO - 20 MHz. Dual channel	2,3,18
4	Three phase Auto Transformer -10/5 kVA, Input 415 V 3 phase. 50 Hz. Output 0-415 V, 10/20 A	4,5
5	Rheostat (0-500 Ohm, 1.2A), Nichrome wire wound rheostat on epoxy resin or class F insulating tube with two fixed and one sliding contact	7
6	Rheostat (0-100 Ohm, 5A), Nichrome wire wound rheostat on epoxy resin or class F insulating tube with two fixed and one sliding contact	8
7	DC Ammeter range (0-5-10A), Portable analog PMMC type as per relevant BIS standard	7
8	DC series and shunt machines at least one each (up to 230 V, 3/5 HP).	7,8
9	D. C. Supply, A 230 V d.c. supply (with inbuilt rectifier to convert a.c.to d.c)	7,8
10	DC Voltmeter Range (0-150/300V), Portable analog PMMC type as per relevant BIS standard.	7,8
11	AC Ammeter range (0-2.5-5-10A), Portable analog MI type as per relevant BIS standard	5,6,13,14
12	AC Voltmeter Range (150/300/600V), Portable analog MI type as per relevant BIS standard	5,6
13	Lamp Bank load -230 V 0-10 A	13,14
14	Tachometer, noncontact type 0-10000rpm	7,8,9,10
15	Single phase Universal motor -1/4 or 1/2 HP ,230 V	9
16	Earth tester analog/digital type	15
17	Variable DC power supply 0-30V, 2A, SC protection, display for voltage and current.	16,17,21,22,23,24
18	Digital Multimeter: 3 1/2 digit	1,16,17,21,22,23
19	Electronic Work Bench: Bread Board: 840 tie points, Withstanding Voltage: 1,000V AC, Positive and Negative power rails on opposite side of the board, connecting wires.	16,17,18,21,22,23,24

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Basic Electrical Fundamentals	CO1	11	4	6	4	14
2	II	Electrical Machines.	CO2	10	2	6	4	12
3	III	Electrical Safety and Protective Devices.	CO3	9	2	4	4	10
4	IV	Special purpose diodes and their applications.	CO4	10	4	4	4	12
5	V	Transistors	CO5	12	4	6	2	12
6	VI	Sensors and Transducers	CO6	8	2	4	4	10
Grand Total				**60**	**18**	**30**	**22**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two offline unit tests of 30 marks (Basic Electrical of 15 marks, Basic Electronics of 15 marks) and average of two unit test marks will be consider for out of 30 marks.
- For formative assessment of laboratory learning 50 marks (Basic Electrical -25 marks, Basic Electronics- 25 marks).
- Each practical will be assessed considering 60% weightage to process, 40% weightage to product.
- Note: Unit test will be conducted on written pattern (Not MCQ based)

Summative Assessment (Assessment of Learning)

- End semester assessment of 70 marks through online MCQ examination.
- End semester summative assessment of 50 marks for laboratory learning (Basic Electrical- 25 marks, Basic Electronics- 25 marks)

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	--	--	2	--		2			
CO2	2	--	--	2	--		2			
CO3	2	--	--	3	2		3			
CO4	3	--	--	1	--		2			
CO5	3	--	--	1	--		2			
CO6	2	--	--	2	2		3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Theraja, B. L. Theraja, A. K.	A Text Book of Electrical Technology Vol-I	S.Chand and Co. New Delhi 2014 ISBN: 9788121924405
2	Mittle, V. N.	Basic Electrical Engg.	Tata McGraw-Hill, New Delhi ISBN : 978-0-07-0088572-5
3	Sedha R.S.	Applied Electronics	S. Chand, New Delhi,2015 ISBN:9788121927833
4	Hughes, Edward	Electrical Technology	Pearson Education, New Delhi ISBN-13: 978-0582405196
5	V.K. Mehta	Principles of Electronics	S.Chand and Co Ram Nagar, New Delhi-110055,11th edition 2014 ISBN 9788121924504

Sr.No	Author	Title	Publisher with ISBN Number
6	Saxena, S. B. Lal	Fundamentals of Electrical Engineering	Cambridge University Press, New Delhi ISBN : 9781107464353
7	Jegathesan, V.	Basic Electrical and Electronics Engineering	Wiley India, New Delhi 2014 ISBN : 97881236529513
8	Boylestad, Robert Nashelsky Louis	Electronic Devices and Circuit Theory	Pearson Education. New Delhi 2014 ISBN:9780132622264
9	Sawhney A.K.	Electrical and Electronic Measurements and Instrumentation	Dhanpat Rai and Sons, New Delhi,2005, ISBN:13-9788177000160
10	Kalsi H.S.	Electronic Instrumentation	McGraw Hill, New Delhi,2010 ISBN:13-9780070702066

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=anCnrtjNLQM	LVDT
2	https://qr.page/g/4PABoASTZYW	Transistor as an Amplifier
3	https://youtu.be/XT-UmPviH64?si=MLIZBB5BgOA2SWBk	Electromagnetic Induction
4	https://youtu.be/M-QfX2fvpp4?si=xpZDAiX3-_7xrnnr	Basics of magnetic circuits
5	https://archive.nptel.ac.in/courses/117/106/117106108/	Basic electrical circuits
6	https://archive.nptel.ac.in/courses/108/105/108105155/	Electrical Machines-1
7	https://youtu.be/ivP_8w4FegE?si=5BLH_hvyhros570A	Single phase and Three phase electrical system
8	https://byjus.com/physics/working-principle-of-an-electrical-fuse/	Electrical fuse
9	https://youtu.be/9Xgn40eGcqY?si=YQy0vmxQ_yGR8-tz	Miniature circuit breaker
10	https://youtu.be/ikLhqUCQKkc?si=8VqRbV1zZlQUSYLd	Earth leakage circuit breaker
11	https://www.tutorialspoint.com/difference-between-bjt-and-fe t	BJT's and FET's
12	https://www.tutorialspoint.com/difference-between-sensor-and -transducer	Sensors and Transducers
13	https://www.electrical4u.com/jfet-or-junction-field-effect-transistor/	Junction Field Effect Transistor
14	https://fossee.in/	Open Source Electronics Simulation software
15	https://cloud.scilab.in/	Open Source Scilab Cloud for Electronics Simulation

Programme Name/s	**: Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Cloud Computing and Big Data/ Computer Technology/ Computer Engineering/ Computer Science & Engineering/ Data Sciences/ Computer Hardware & Maintenance/ Information Technology/ Computer Science & Information Technology**
Programme Code	**: AI/ AN/ BD/ CM/ CO/ CW/ DS/ HA/ IF/ IH**
Semester	**: Second**
Course Title	**: PROGRAMMING IN C**
Course Code	**: 312303**

I. RATIONALE

'C' programming language helps to build a strong foundation for computer programming. This course will help to solve beginner level problems such as mathematical operations, string processing, data structure and data structure related processing, with the help of basic concepts, control flow structures, and principles of C. This course is basically designed to create a base to develop foundation skills of procedure - oriented programming.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the students to attain the following industry identified outcome through various teaching learning experiences: Develop 'C' programs that address issues with processing strings, mathematic operations, and data structures.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Develop C program using input - output functions and arithmetic expressions
- CO2 - Develop C program involving branching and looping statements
- CO3 - Implement Arrays and structures using C programs
- CO4 - Develop C program using user-defined functions
- CO5 - Write C program using pointer

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
312303	PROGRAMMING IN C	PIC	AEC	4	1	4	1	10	5	3	30	70	100	40	50	20	50#	20	25	10	225

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Write algorithm for given problem statement. TLO 1.2 Identify the given building blocks of a C Program. TLO 1.3 Use basic constructs like constants, variables, data types for developing C program. TLO 1.4 Write C programs using printf() and scanf() functions. TLO 1.5 Write C programs using arithmetic operators, bitwise operators.	**Unit - I Basics of 'C' Programming** 1.1 Fundamentals of algorithms: Notion of algorithm, Notations used for assignment statements and basic control structures. 1.2 Introduction to 'C': General structure of ' C' program, Header file, 'main ()' function. 1.3 Fundamental constructs of 'C': Character set, tokens, keywords, Identifiers, Constants - number constants, character constants, string constants, Variables. Data types in 'C': Declaring variables, data type conversion. 1.4 Basic Input and Output functions: input and output statements using printf(), scanf() functions. 1.5 Assignments and expressions: simple assignment statements, arithmetic operators, shift operators, bitwise operators, sizeof operator.	Chalk-Board Demonstration Hands-on
2	TLO 2.1 Write a 'C' program using decision making statements. TLO 2.2 Use loop statements in C program to solve iterative problems. TLO 2.3 Use appropriate statement to alter the program flow in the loop.	**Unit - II Control structures** 2.1 Conditional statements: Relational operators, logical operators, if statement, if-else statements, nested if-else statements, if-else ladder, switch statement. 2.2 Looping statements : 2.1 while loop, do… while loop, for loop. 2.3 Branching Statements: goto statement, use of 'break' and 'continue' statements.	Chalk-Board Demonstration Presentations Hands-on

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Write a C Program to perform operations on one dimensional array. TLO 3.2 Declare, initialize, and access elements of two dimensional array. TLO 3.3 Declare ,initialize and access data using Structure. TLO 3.4 Explain typedef and enum	**Unit - III Arrays and structure** 3.1 Characteristics of an array, One dimension and two dimensional arrays, concept of multi-dimensional arrays. 3.2 Array declaration and Initialization. 3.3 Operations on Arrays. 3.4 Character and String input/output and String related operations. 3.5 Introduction and Features of Structures, Declaration and Initialization of Structures, array of structures. 3.6 Type def, Enumerated Data Type.	Chalk-Board Demonstration Hands-on Video Demonstrations
4	TLO 4.1 Explain need of Functions in C program. TLO 4.2 Write C Program involving C library functions. TLO 4.3 Write user defined functions for given problem in C program. TLO 4.4 Write C Program for calling function by 'value' and calling function by 'reference'. TLO 4.5 Implement recursive functions in C Program.	**Unit - IV Functions** 4.1 Concept and need of functions. 4.2 Library functions: Math functions, String handling functions, other miscellaneous functions such as getchar(), putchar(), malloc(), calloc(). 4.3 Writing User defined functions - function definition, functions declaration, function call, scope of variables - local variables, global variables. 4.4 Function parameters: Parameter passing- call by value & call by reference, function return values, function return types ,declaring function return types, The 'return' statement. 4.5 Recursive functions.	Chalk-Board Demonstration Presentations Hands-on
5	TLO 5.1 Declare and Define Pointer Variable. TLO 5.2 Write C program to print the address and values of pointer variables. TLO 5.3 Write C program to perform arithmetic operations using pointers. TLO 5.4 Write C Program to perform operations on Arrays using Pointers. TLO 5.5 Explain string related operations using pointer. TLO 5.6 Access individual variable of structure using Pointer.	**Unit - V Pointers** 5.1 Introduction to Pointers : Definition, use of pointers, '*' and '&' operators, declaring, initializing, accessing pointers. 5.2 Pointer arithmetic. 5.3 Pointer to array. 5.4 Pointer and Text string. 5.5 Function handling using pointers. 5.6 Pointers to structure.	Demonstration Chalk-Board Presentations Hands-on

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs

<table>
<tr><th>Practical / Tutorial / Laboratory Learning Outcome (LLO)</th><th>Sr No</th><th>Laboratory Experiment / Practical Titles / Tutorial Titles</th><th>Number of hrs.</th><th>Relevant COs</th></tr>
<tr><td>LLO 1.1 Write logical steps for given program flow
LLO 1.2 Write the standard English like statements for programming flow of given problem statement</td><td>1</td><td>* Install and study the C programming environment</td><td>2</td><td>CO1</td></tr>
<tr><td>LLO 2.1 Write Simple C program using constant and variables
LLO 2.2 Use the arithmetic operators for developing C Program</td><td>2</td><td>Implement C programs using Constants and Variables</td><td>2</td><td>CO1</td></tr>
<tr><td>LLO 3.1 Use Arithmetic operators in C Program</td><td>3</td><td>* Implement C programs using arithmetic operators to solve given arithmetic operations</td><td>2</td><td>CO1</td></tr>
<tr><td>LLO 4.1 Write code for type casting in C</td><td>4</td><td>Implement C programs using implicit and Explicit data type conversion</td><td>2</td><td>CO1</td></tr>
<tr><td>LLO 5.1 Write C code for displaying formatted output with comments wherever applicable.</td><td>5</td><td>* Write well commented C programs using formatted Input/Output statements.

e.g. Sample Output:
<table><tr><td>Name</td><td>:</td><td>FName MName Lname</td></tr><tr><td>Roll No</td><td>:</td><td>XXXX</td></tr><tr><td>Percentage</td><td>:</td><td>(upto 2 decimal places)</td></tr><tr><td>Date of Birth</td><td>:</td><td>DD/MM/YYYY</td></tr><tr><td>Branch, College</td><td>:</td><td>XXXXXXXXXXXXX</td></tr></table></td><td>4</td><td>CO1</td></tr>
<tr><td>LLO 6.1 Use Relational and logical operators in C to solve given problem
LLO 6.2 Write C program using Relational and logical operators for solving given problem</td><td>6</td><td>* Implement minimum two C programs using Relational and conditional operator.</td><td>2</td><td>CO1
CO2</td></tr>
<tr><td>LLO 7.1 Use logical operators in given expressions</td><td>7</td><td>* Implement minimum two C programs using Logical Operators</td><td>2</td><td>CO1
CO2</td></tr>
<tr><td>LLO 8.1 Write expressions using bitwise operators in given problem statement</td><td>8</td><td>Implement minimum two C programs using Bitwise Operators</td><td>2</td><td>CO1
CO2</td></tr>
<tr><td>LLO 9.1 Write the syntax for various if statements
LLO 9.2 Write C program for any problem using If statements</td><td>9</td><td>Implement minimum two C programs using simple If statement and if..else statement.</td><td>2</td><td>CO2</td></tr>
</table>

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 10.1 Write syntax of if.. else statements	10	* Implement minimum two C programs using nested If ..else statement and if.. else if ladder e.g.- Write and Execute the C program to print the grades of students based on percentage. Grade: Distinction If per>=75 Grade: A If per>=60 and Per<75 Grade: B If per>=55 and Per<60 Grade: Pass If per>=40 and Per<55 Grade:Fail if per<40	4	CO2
LLO 11.1 Write syntax of Switch statement to solving given problem	11	* Develop C program using Switch staements	2	CO2
LLO 12.1 Write C program using Switch statement.	12	* Write a C program to print English Calendar months as per given number(eg: If input is 4 then print “April”) using Switch statement	2	CO2
LLO 13.1 Implement iterative solution to problem using while and do - - while loop	13	* Implement minimum two C programs using 'while' loop and 'do...while' loop statements.	2	CO2
LLO 14.1 Write the syntax for statement. LLO 14.2 Write C code for solving given problem using for loop.	14	Implement C programs using for loop statement (e.g.- Write a C Program to print numbers from 1 to 100)	2	CO1 CO2
LLO 15.1 Write syntax for while and do ... while loop LLO 15.2 Write syntax for 'for' loop	15	* Print various patterns using loops. e.g. - Write C Program to print following or similar pattern * * * * * * * * * *	2	CO2
LLO 16.1 Declare and initialize the Array. LLO 16.2 Write C program for implementation of one dimensional array.	16	* Implement C programs using One Dimensional Array. (e.g.-Write C program to input 5 numbers using array and display sum of it)	2	CO2 CO3

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 17.1 Declare and initialize two dimensional Array. LLO 17.2 Write C program for implementation of two dimensional array.	17	* Implement C programs using Two Dimensional Array. (e.g.-Write C program to calculate addition of two 3X3 matrices.)	4	CO3
LLO 18.1 Declare character array as Strings in C LLO 18.2 Write C programs for print string operations without using string handling functions	18	* Write C program to perform following operations without using standard string functions. i) Calculate Length of given string ii) Print reverse of given string.	2	CO3
LLO 19.1 Declare ,define and access structure variables	19	Implement 'Structure' in C (e.g. - Add and Substract complex numbers using structure)	4	CO3
LLO 20.1 Write C programs using Array of Structure	20	* Implement ' Array of Structure' in C (e.g.-Accept and Display 10 Employee information using structure)	2	CO3
LLO 21.1 Use built-in library functions in C programs	21	* Develop C program using in-built mathematical and string functions.	2	CO4
LLO 22.1 Write C programs using user defined functions	22	* Write C program to demonstrate User defined Functions	4	CO4
LLO 23.1 Write Recursive functions in C.	23	Implement recursive functions in C program.	2	CO4
LLO 24.1 Declare and initialize pointer variables LLO 24.2 Write C program to access variables using pointers.	24	* Write C Program to print addresses and values of variables using Pointer. (e.g.- Write C program to access and display address of variables.)	2	CO5
LLO 25.1 Perform arithmetic operations using pointers.	25	* Implement C Programs to perform arithmetic operations using Pointer.	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Self learning

- 1.Complete any one course related to Programming in C on Infosys Springboard

2.Develop C language code for relevant topics suggested by the teacher

Assignment

- 1.Solve an assignment on any relevant topic given by the teacher

Micro project

- The micro project has to be Industry Application Based, Internet-based, Workshop-based, Laboratory-based or Field-based as suggested by Teacher

1. Prepare a simple calculator to perform mathematical operations. Accept values and operations to be performed from user. Allow only numeric values else show appropriate messages to user.
2. Prepare menu driven program for Invoice management system. Accept user inputs and generate receipt and calculate amounts as per purchased items.
3. Develop employee leave management system to display leave related information of employee.
4. Develop food menu card for restaurant. Display food items. Accept food menu, quantity and generate bill for the same.
5. Develop a menu-driven program to perform matrix operations - matrix addition, matrix multiplication, transpose of matrix .

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	1 Computer system - (Any computer system with basic configuration)	All
2	2 ‘C’ Compiler (Any)	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Basics of ‘C’ Programming	CO1	10	4	2	6	12
2	II	Control structures	CO1,CO2	14	4	4	8	16
3	III	Arrays and structure	CO3	12	4	4	8	16
4	IV	Functions	CO4	12	2	4	8	14
5	V	Pointers	CO5	12	2	2	8	12
Grand Total				**60**	**16**	**16**	**38**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Continuous assessment based on process and product related performance indicators
- Each practical will be assessed considering

60% weightage to process
40% weightage to product

- A continuous assessment based term work

Summative Assessment (Assessment of Learning)

- End semester examination, Lab performance, Viva voce

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	2	2	1	-	-	1			
CO2	2	3	3	2	-	-	2			
CO3	2	3	3	3	-	2	2			
CO4	1	3	3	3	1	2	3			
CO5	1	3	3	3	1	1	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	E. Balaguruswamy	Programming in ANSI 'C'	Mcgraw Hill Publications ISBN 0070534772
2	Yashwant Kanetkar	Let us 'C'	BPB Publication ISBN 9788183331630
3	David Griffiths, Dawn Griffiths	Head First C	O'Reilly Media, Inc. ISBN: 9781449345013

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://nptel.ac.in/courses/106104128	C Programming
2	https://jsommers.github.io/cbook/control.html	Control structures, flow control statements in C
3	https://www.learn-c.org/en/Functions	Functions
4	https://www.simplilearn.com/tutorials/c-tutorial/pointers-in-c	Pointers
5	https://www.w3schools.com/c/	C Programming
6	https://www.javatpoint.com/c-programming-language-tutorial	C Programming tutorial
7	https://www.programiz.com/c-programming	C Programming
8	https://www.programiz.com/c-programming/online-compiler/	online C compiler

Programme Name/s	**: Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Cloud Computing and Big Data/ Computer Technology/ Computer Engineering/ Computer Science & Engineering/ Data Sciences/ Computer Hardware & Maintenance/ Information Technology/ Computer Science & Information Technology**
Programme Code	**: AI/ AN/ BD/ CM/ CO/ CW/ DS/ HA/ IF/ IH**
Semester	**: Second**
Course Title	**: PROGRAMMING IN C**
Course Code	**: 312303**

I. RATIONALE

'C' programming language helps to build a strong foundation for computer programming. This course will help to solve beginner level problems such as mathematical operations, string processing, data structure and data structure related processing, with the help of basic concepts, control flow structures, and principles of C. This course is basically designed to create a base to develop foundation skills of procedure - oriented programming.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the students to attain the following industry identified outcome through various teaching learning experiences: Develop 'C' programs that address issues with processing strings, mathematic operations, and data structures.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Develop C program using input - output functions and arithmetic expressions
- CO2 - Develop C program involving branching and looping statements
- CO3 - Implement Arrays and structures using C programs
- CO4 - Develop C program using user-defined functions
- CO5 - Write C program using pointer

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
312303	PROGRAMMING IN C	PIC	AEC	4	1	4	1	10	5	3	30	70	100	40	50	20	50#	20	25	10	225

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Write algorithm for given problem statement. TLO 1.2 Identify the given building blocks of a C Program. TLO 1.3 Use basic constructs like constants, variables, data types for developing C program. TLO 1.4 Write C programs using printf() and scanf() functions. TLO 1.5 Write C programs using arithmetic operators, bitwise operators.	**Unit - I Basics of 'C' Programming** 1.1 Fundamentals of algorithms: Notion of algorithm, Notations used for assignment statements and basic control structures. 1.2 Introduction to 'C': General structure of ' C' program, Header file, 'main ()' function. 1.3 Fundamental constructs of 'C': Character set, tokens, keywords, Identifiers, Constants - number constants, character constants, string constants, Variables. Data types in 'C': Declaring variables, data type conversion. 1.4 Basic Input and Output functions: input and output statements using printf(), scanf() functions. 1.5 Assignments and expressions: simple assignment statements, arithmetic operators, shift operators, bitwise operators, sizeof operator.	Chalk-Board Demonstration Hands-on
2	TLO 2.1 Write a 'C' program using decision making statements. TLO 2.2 Use loop statements in C program to solve iterative problems. TLO 2.3 Use appropriate statement to alter the program flow in the loop.	**Unit - II Control structures** 2.1 Conditional statements: Relational operators, logical operators, if statement, if-else statements, nested if-else statements, if-else ladder, switch statement. 2.2 Looping statements : 2.1 while loop, do… while loop, for loop. 2.3 Branching Statements: goto statement, use of 'break' and 'continue' statements.	Chalk-Board Demonstration Presentations Hands-on

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Write a C Program to perform operations on one dimensional array. TLO 3.2 Declare, initialize, and access elements of two dimensional array. TLO 3.3 Declare ,initialize and access data using Structure. TLO 3.4 Explain typedef and enum	**Unit - III Arrays and structure** 3.1 Characteristics of an array, One dimension and two dimensional arrays, concept of multi-dimensional arrays. 3.2 Array declaration and Initialization. 3.3 Operations on Arrays. 3.4 Character and String input/output and String related operations. 3.5 Introduction and Features of Structures, Declaration and Initialization of Structures, array of structures. 3.6 Type def, Enumerated Data Type.	Chalk-Board Demonstration Hands-on Video Demonstrations
4	TLO 4.1 Explain need of Functions in C program. TLO 4.2 Write C Program involving C library functions. TLO 4.3 Write user defined functions for given problem in C program. TLO 4.4 Write C Program for calling function by 'value' and calling function by 'reference'. TLO 4.5 Implement recursive functions in C Program.	**Unit - IV Functions** 4.1 Concept and need of functions. 4.2 Library functions: Math functions, String handling functions, other miscellaneous functions such as getchar(), putchar(), malloc(), calloc(). 4.3 Writing User defined functions - function definition, functions declaration, function call, scope of variables - local variables, global variables. 4.4 Function parameters: Parameter passing- call by value & call by reference, function return values, function return types ,declaring function return types, The 'return' statement. 4.5 Recursive functions.	Chalk-Board Demonstration Presentations Hands-on
5	TLO 5.1 Declare and Define Pointer Variable. TLO 5.2 Write C program to print the address and values of pointer variables. TLO 5.3 Write C program to perform arithmetic operations using pointers. TLO 5.4 Write C Program to perform operations on Arrays using Pointers. TLO 5.5 Explain string related operations using pointer. TLO 5.6 Access individual variable of structure using Pointer.	**Unit - V Pointers** 5.1 Introduction to Pointers : Definition, use of pointers, '*' and '&' operators, declaring, initializing, accessing pointers. 5.2 Pointer arithmetic. 5.3 Pointer to array. 5.4 Pointer and Text string. 5.5 Function handling using pointers. 5.6 Pointers to structure.	Demonstration Chalk-Board Presentations Hands-on

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs

<table>
<tr><th>Practical / Tutorial / Laboratory Learning Outcome (LLO)</th><th>Sr No</th><th>Laboratory Experiment / Practical Titles / Tutorial Titles</th><th>Number of hrs.</th><th>Relevant COs</th></tr>
<tr><td>LLO 1.1 Write logical steps for given program flow
LLO 1.2 Write the standard English like statements for programming flow of given problem statement</td><td>1</td><td>* Install and study the C programming environment</td><td>2</td><td>CO1</td></tr>
<tr><td>LLO 2.1 Write Simple C program using constant and variables
LLO 2.2 Use the arithmetic operators for developing C Program</td><td>2</td><td>Implement C programs using Constants and Variables</td><td>2</td><td>CO1</td></tr>
<tr><td>LLO 3.1 Use Arithmetic operators in C Program</td><td>3</td><td>* Implement C programs using arithmetic operators to solve given arithmetic operations</td><td>2</td><td>CO1</td></tr>
<tr><td>LLO 4.1 Write code for type casting in C</td><td>4</td><td>Implement C programs using implicit and Explicit data type conversion</td><td>2</td><td>CO1</td></tr>
<tr><td>LLO 5.1 Write C code for displaying formatted output with comments wherever applicable.</td><td>5</td><td>* Write well commented C programs using formatted Input/Output statements.

e.g. Sample Output:
<table><tr><td>Name</td><td>:</td><td>FName MName Lname</td></tr><tr><td>Roll No</td><td>:</td><td>XXXX</td></tr><tr><td>Percentage</td><td>:</td><td>(upto 2 decimal places)</td></tr><tr><td>Date of Birth</td><td>:</td><td>DD/MM/YYYY</td></tr><tr><td>Branch, College</td><td>:</td><td>XXXXXXXXXXXXX</td></tr></table></td><td>4</td><td>CO1</td></tr>
<tr><td>LLO 6.1 Use Relational and logical operators in C to solve given problem
LLO 6.2 Write C program using Relational and logical operators for solving given problem</td><td>6</td><td>* Implement minimum two C programs using Relational and conditional operator.</td><td>2</td><td>CO1
CO2</td></tr>
<tr><td>LLO 7.1 Use logical operators in given expressions</td><td>7</td><td>* Implement minimum two C programs using Logical Operators</td><td>2</td><td>CO1
CO2</td></tr>
<tr><td>LLO 8.1 Write expressions using bitwise operators in given problem statement</td><td>8</td><td>Implement minimum two C programs using Bitwise Operators</td><td>2</td><td>CO1
CO2</td></tr>
<tr><td>LLO 9.1 Write the syntax for various if statements
LLO 9.2 Write C program for any problem using If statements</td><td>9</td><td>Implement minimum two C programs using simple If statement and if..else statement.</td><td>2</td><td>CO2</td></tr>
</table>

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 10.1 Write syntax of if.. else statements	10	* Implement minimum two C programs using nested If ..else statement and if.. else if ladder e.g.- Write and Execute the C program to print the grades of students based on percentage. Grade: Distinction If per>=75 Grade: A If per>=60 and Per<75 Grade: B If per>=55 and Per<60 Grade: Pass If per>=40 and Per<55 Grade:Fail if per<40	4	CO2
LLO 11.1 Write syntax of Switch statement to solving given problem	11	* Develop C program using Switch staements	2	CO2
LLO 12.1 Write C program using Switch statement.	12	* Write a C program to print English Calendar months as per given number(eg: If input is 4 then print “April”) using Switch statement	2	CO2
LLO 13.1 Implement iterative solution to problem using while and do - - while loop	13	* Implement minimum two C programs using 'while' loop and 'do...while' loop statements.	2	CO2
LLO 14.1 Write the syntax for statement. LLO 14.2 Write C code for solving given problem using for loop.	14	Implement C programs using for loop statement (e.g.- Write a C Program to print numbers from 1 to 100)	2	CO1 CO2
LLO 15.1 Write syntax for while and do ... while loop LLO 15.2 Write syntax for 'for' loop	15	* Print various patterns using loops. e.g. - Write C Program to print following or similar pattern * * * * * * * * * *	2	CO2
LLO 16.1 Declare and initialize the Array. LLO 16.2 Write C program for implementation of one dimensional array.	16	* Implement C programs using One Dimensional Array. (e.g.-Write C program to input 5 numbers using array and display sum of it)	2	CO2 CO3

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 17.1 Declare and initialize two dimensional Array. LLO 17.2 Write C program for implementation of two dimensional array.	17	* Implement C programs using Two Dimensional Array. (e.g.-Write C program to calculate addition of two 3X3 matrices.)	4	CO3
LLO 18.1 Declare character array as Strings in C LLO 18.2 Write C programs for print string operations without using string handling functions	18	* Write C program to perform following operations without using standard string functions. i) Calculate Length of given string ii) Print reverse of given string.	2	CO3
LLO 19.1 Declare ,define and access structure variables	19	Implement 'Structure' in C (e.g. - Add and Substract complex numbers using structure)	4	CO3
LLO 20.1 Write C programs using Array of Structure	20	* Implement ' Array of Structure' in C (e.g.-Accept and Display 10 Employee information using structure)	2	CO3
LLO 21.1 Use built-in library functions in C programs	21	* Develop C program using in-built mathematical and string functions.	2	CO4
LLO 22.1 Write C programs using user defined functions	22	* Write C program to demonstrate User defined Functions	4	CO4
LLO 23.1 Write Recursive functions in C.	23	Implement recursive functions in C program.	2	CO4
LLO 24.1 Declare and initialize pointer variables LLO 24.2 Write C program to access variables using pointers.	24	* Write C Program to print addresses and values of variables using Pointer. (e.g.- Write C program to access and display address of variables.)	2	CO5
LLO 25.1 Perform arithmetic operations using pointers.	25	* Implement C Programs to perform arithmetic operations using Pointer.	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Self learning

- 1.Complete any one course related to Programming in C on Infosys Springboard

2.Develop C language code for relevant topics suggested by the teacher

Assignment

- 1.Solve an assignment on any relevant topic given by the teacher

Micro project

- The micro project has to be Industry Application Based, Internet-based, Workshop-based, Laboratory-based or Field-based as suggested by Teacher

1. Prepare a simple calculator to perform mathematical operations. Accept values and operations to be performed from user. Allow only numeric values else show appropriate messages to user.
2. Prepare menu driven program for Invoice management system. Accept user inputs and generate receipt and calculate amounts as per purchased items.
3. Develop employee leave management system to display leave related information of employee.
4. Develop food menu card for restaurant. Display food items. Accept food menu, quantity and generate bill for the same.
5. Develop a menu-driven program to perform matrix operations - matrix addition, matrix multiplication, transpose of matrix .

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	1 Computer system - (Any computer system with basic configuration)	All
2	2 ‘C’ Compiler (Any)	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Basics of ‘C’ Programming	CO1	10	4	2	6	12
2	II	Control structures	CO1,CO2	14	4	4	8	16
3	III	Arrays and structure	CO3	12	4	4	8	16
4	IV	Functions	CO4	12	2	4	8	14
5	V	Pointers	CO5	12	2	2	8	12
Grand Total				**60**	**16**	**16**	**38**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Continuous assessment based on process and product related performance indicators
- Each practical will be assessed considering

60% weightage to process
40% weightage to product

- A continuous assessment based term work

Summative Assessment (Assessment of Learning)

- End semester examination, Lab performance, Viva voce

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	2	2	1	-	-	1			
CO2	2	3	3	2	-	-	2			
CO3	2	3	3	3	-	2	2			
CO4	1	3	3	3	1	2	3			
CO5	1	3	3	3	1	1	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	E. Balaguruswamy	Programming in ANSI 'C'	Mcgraw Hill Publications ISBN 0070534772
2	Yashwant Kanetkar	Let us 'C'	BPB Publication ISBN 9788183331630
3	David Griffiths, Dawn Griffiths	Head First C	O'Reilly Media, Inc. ISBN: 9781449345013

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://nptel.ac.in/courses/106104128	C Programming
2	https://jsommers.github.io/cbook/control.html	Control structures, flow control statements in C
3	https://www.learn-c.org/en/Functions	Functions
4	https://www.simplilearn.com/tutorials/c-tutorial/pointers-in-c	Pointers
5	https://www.w3schools.com/c/	C Programming
6	https://www.javatpoint.com/c-programming-language-tutorial	C Programming tutorial
7	https://www.programiz.com/c-programming	C Programming
8	https://www.programiz.com/c-programming/online-compiler/	online C compiler

Programme Name/s	**: Architecture Assistantship/ Automobile Engineering./ Artificial Intelligence/ Agricultural Engineering/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Architecture/ Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Fashion & Clothing Technology/ Dress Designing & Garment Manufacturing/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Food Technology/ Computer Hardware & Maintenance/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Instrumentation/ Interior Design & Decoration/ Interior Design/ Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Medical Laboratory Technology/ Medical Electronics/ Production Engineering/ Printing Technology/ Polymer Technology/ Surface Coating Technology/ Textile Technology/ Electronics & Computer Engg./ Travel and Tourism/ Textile Manufactures**
Programme Code	**: AA/ AE/ AI/ AL/ AN/ AO/ AT/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DC/ DD/ DE/ DS/ EE/ EJ/ EP/ ET/ EX/ FC/ HA/ IC/ IE/ IF/ IH/ IS/ IX/ IZ/ LE/ ME/ MK/ ML/ MU/ PG/ PN/ PO/ SC/ TC/ TE/ TR/ TX**
Semester	**: Second**
Course Title	**: PROFESSIONAL COMMUNICATION**
Course Code	**: 312002**

I. RATIONALE

Communication is key to smooth and efficient functioning of any industry or business . Professional communication is the need of every organization to maintain ethics, quality and standards. The efficacy of business communication skills are essential for engineering professionals to instruct, guide and motivate peers/ subordinates to achieve desired goals at work place. Strong Communication skills are highly valued in the professional world and contribute to career growth and opportunities. Thus, this course has been designed to enhance the professional communication skills for effective presentation both in written and oral forms at workplace.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

1. Communicate effectively at workplace. 2. Issues can be identified and resolved by brainstorming solutions 3. Effective communication ensures strong decision making

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Communicate effectively (oral / spoken and Written) in various formal and informal situations minimizing the barriers.
- CO2 - Develop listening skills through active listening and note taking.
- CO3 - Write circulars, notices and minutes of the meeting.
- CO4 - Draft inquiry letter, complaint letter , Job application with resume / CV, Compose effective E - mails .

- CO5 - Write Industrial reports.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
312002	PROFESSIONAL COMMUNICATION	PCO	SEC	-	-	2	-	2	1	-	-	-	-	-	25	10	25@	10	-	-	50

Total IKS Hrs for Sem. : 0 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Describe the importance of professional communication in given situations TLO 1.2 Identify the types of communication barriers in given situations and suggestive remedies TLO 1.3 Use different types of verbal and non–verbal communication for the given situation	**Unit - I Professional Communication : An Overview** 1.1 Definition of professional communication- Importance, relevance, Elements and process of communication 1.2 7 C's of Professional Communication (Clarity, Conciseness, correctness, Coherent, concrete, courteous and Complete) 1.3 Types –Verbal (Oral-Written),Formal, Informal (Grapevine), Vertical 1.4 Barriers to communication,Types of barriers (Linguistic, Psychological, Technological)	Language lab Role plays Chalk board Reference books Case studies

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Identify the difference between listening and hearing TLO 2.2 Differentiate the types of listening in various situations TLO 2.3 Take notes during lectures, seminars . Make use of types of note taking and note making for different subjects / topics	**Unit - II Listening & Note Taking** 2.1 Difference between listening & Hearing 2.2 Types of listening a)Active listening b)Passive listening c)Selective listening 2.3 Techniques of Note taking , Types of note taking (Outline notes, Mind Mapping, Flowcharts)	Language Lab Classroom learning NPTEL Role Play
3	TLO 3.1 Prepare notices / agenda for the given type of meeting / information TLO 3.2 Prepare minutes of meeting/s TLO 3.3 Draft a circular for a particular information/ event	**Unit - III Office Drafting** 3.1 Format of Notice and Circular 3.2 Drafting Agenda 3.3 Preparing Minutes of meeting	white board Language Lab Reference books Classroom learning
4	TLO 4.1 Compose cover letter and CV / Resume for jobs TLO 4.2 Apply E- mail Etiquette for professional purposes TLO 4.3 Compose E- mails for different official purposes	**Unit - IV Writing Skills for Professional Communication** 4.1 Job Application with Resume / CV 4.2 E-Mail Etiquettes 4.3 Writing official E- Mails to communicate intended purposes 4.4 Drafting Enquiry letter and Complaint letter	Language lab Classroom learning NPTEL Reference books
5	TLO 5.1 Compose technical reports TLO 5.2 Draft accident / Investigation/ Daily reports	**Unit - V Report Writing** 5.1 Introduction to report writing 5.2 Accident Report 5.3 Investigation Report 5.4 Daily Report	Chalk and talk Language Lab Collaborative learning Classroom learning

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Draw communication cycle using real life examples and explain process of communication.	1	*Communication Process and Cycle	2	CO1
LLO 2.1 Undertake the Role play / Group discussion to illustrate types / barriers to communication	2	Role plays and Group Discussion	2	CO1
LLO 3.1 Listen to audios in the language lab and make notes of it.	3	*Active Listening	2	CO2
LLO 4.1 Give a presentation / Seminar using 7 C's of Communication.	4	*Presentations / Seminars	2	CO1
LLO 5.1 Explain the types of note taking with examples and make notes on any one topic related to your curriculum.	5	*Note taking and Note Making	2	CO2
LLO 6.1 Prepare agenda for meeting and draft minutes of the meeting.	6	*Agenda and Minutes of the meeting	2	CO3
LLO 7.1 Draft circulars for the given situation .	7	*Office Drafting	2	CO3

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 8.1 Respond to job advertisements referring newspapers, LinkedIn. Write cover letter with resume /CV.	8	*Type Job Application with Resume / CV	2	CO4
LLO 9.1 Type Four (formal) E-mails using ethics and etiquette.	9	* E- Mail writing	2	CO4
LLO 10.1 Write a detailed report on Accident/ Investigation .	10	*Technical Report writing	2	CO5
LLO 11.1 Prepare a case study related to linguistic barriers : language ,pronunciation, punctuation, technical jargon and suggest remedies for the same.	11	*Barriers to Communication	2	CO1
LLO 12.1 Draft complaint / enquiry letter for various situations	12	Complaint and Enquiry letter	2	CO4
LLO 13.1 List psychological barriers to communication LLO 13.2 Prepare case studies on any two psychological barriers and suggest remedies to overcome the barriers	13	Psychological barriers to Communication	2	CO1
LLO 14.1 Draw flow chart and mind mapping for any topic related to the curriculum.	14	*Listening Skills	2	CO2
LLO 15.1 Face mock interview arranged by your teacher.	15	* Typed Job Application , Resume / CV/ formal dressing and Interview	2	CO4

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Conduct an interview of any person and follow the procedure (interview questions, photo with the interviewee etc.)
- Listening and Speaking are life long learnings . Explain with appropriate examples and real life case studies.
- Collect (four to five) emails with technical jargons, barriers, make required corrections and keep a record of both the mails (original and Corrected one)
- Complete any one certification course of (Two Weeks duration) from (MOOC/ NPTEL/ Coursera/ any other source)related to Communication Skills / Personality Development.
- Prepare a report on aspects of body language
- Prepare a case study on Technological /Psychological barriers to communication

Reading for vocabulary and sentence structure

- Read any motivational book and present a review of the book

Note :

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than 15 (fifteen) student engagement hours during the course. In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Language Lab with software and internet facility	All
2	LCD Projector	All
3	Smart Board with networking	All
4	Printer	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table) : NOT APPLICABLE

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Term Work, Micro Project

Summative Assessment (Assessment of Learning)

- Practical Exam of 25 marks using language lab

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	1	1	1		1	3	1			
CO2	1	1				3	1			
CO3	1					3	1			
CO4		1				3	1			
CO5		1	1			3	1			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	M Ashraf Rizvi	Effective Communication Skills	Tata McGraw-Hill Publication-ISBN 0070599521, 9780070599529
2	Sanjay Kumar and Pushp Lata	Communication Skills	Oxford University Press ISBN 9780199457069
3	MSBTE Textbook	Communication Skills	MSBTE
4	Robert King	Effective communication Skills	Audio Book -ISBN 978181667009742
5	N P Sudharshana , C Savitha	English for Technical Communication	Cambridge-ISBN 978-13-16640-08-1
6	C. Murlikrishna , Sunita Mishra	Communication Skills for Engineers	Pearson - ISBN 978-81-317-3384-4
7	Meenakshi Raman, Sangeeta Sharma	Technical Communication, Principles and Practice	Oxford University Press -ISBN 978-13-16640-08-1
8	K. K. Sinha	Business Communication	Galgotiya Publishing company, New Delhi - ISBN 9789356227064
9	Rajendra Pal, J.S. Korlahalli	Essentials of Business Communication	Sultan Chand & Sons, New Delhi ISBN 9788180547294

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.britishcouncil.in	conversations
2	https://www.coursera.org	certification courses
3	https://www.udemy.com	Communication skills training courses
4	http://www.makeuseof.com	Dale Carnegie's free resources

Programme Name/s	**: Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Cloud Computing and Big Data/ Computer Technology/ Computer Engineering/ Computer Science & Engineering/ Data Sciences/ Computer Hardware & Maintenance/ Information Technology/ Computer Science & Information Technology**
Programme Code	**: AI/ AN/ BD/ CM/ CO/ CW/ DS/ HA/ IF/ IH**
Semester	**: Second**
Course Title	**: LINUX BASICS**
Course Code	**: 312001**

I. RATIONALE

Linux Operating System is Open source and freely distributed Operating System (O.S). Apart from the fact that it's freely distributed, Linux's functionality, adaptability, and robustness make it highly suitable for the server platform. The course aims to provide knowledge in the basics of Linux, shell, and command line essentials.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry-identified outcomes through various teaching-learning experiences:

1) To understand the basics of Linux operating system fundamentals and its open-source nature.
2) Basic Scripting Skills for automating tasks and creating custom shell scripts.
3) Ability to perform file operations and manipulate directories.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Install Linux operating system.
- CO2 - Execute general purpose commands of the Linux operating system.
- CO3 - Manage files and directories in Linux operating system.
- CO4 - Use vi editor in Linux operating system.
- CO5 - Write programs using shell script.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
312001	LINUX BASICS	BLP	DSC	2	-	2	-	4	2	-	-	-	-	-	25	10	25@	10	-	-	50

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Describe the History of Linux. TLO 1.2 Identify different types of shells. TLO 1.3 Compare Linux file systems.	**Unit - I Introduction to Linux Operating System** 1.1 Introduction to Operating System and Linux. 1.2 History, Overview of Linux 1.3 Shell: Bourne, Korn, Cshell. 1.4 Linux releases, Linux File Systems (ext) and versions.	Chalk-Board Presentations
2	TLO 2.1 Execute General purpose commands. TLO 2.2 Use of mailx command. TLO 2.3 Display and change your terminal settings.	**Unit - II General Purpose Utilities** 2.1 cal: The calendar, date: Displaying the system date, echo: Displaying message, printf: An alternative to echo, bc: The calculator, script: Recording your session 2.2 Email basics, mailx: The universal mailer 2.3 passwd: Changing your password, who: Who are the users?, uname: Knowing your machine charactristics 2.4 tty: Knowing your terminal, stty: Displayig and setting terminal charactristics	Demonstration Presentations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Explain the file types. TLO 3.2 Use absolute and relative pathnames. TLO 3.3 Execute file and Directory commands. TLO 3.4 Compress and archive files. TLO 3.5 Execute basic file attributes. TLO 3.6 Change file and directory permissions.	**Unit - III File Management in Linux** 3.1 The file: Ordinary file, Directory file, Device file, File name, The parent-child relationship, UNIX file system tree, The Unix file system, The home directory 3.1.1 pwd: Checking your current directory, cd: Changing the current directory, mkdir: Making directories, rmdir: Removing directories, ls: Listing directory contents 3.2 Absolute pathnames, Relative pathnames 3.3 Handling ordinary files, cat: Displaying and creating files, cp: Copying file, rm: Deleting files, mv: Renaming files, more: Paging output 3.4 The lp subsystem: printing a file, file: knowing the file types 3.5 wc: Counting lines, words and characters, od: Displaying data in octal, cmp: Comparing two files, comm: What is common?, diff: Converting one file to other 3.6 gzip and gunzip: Compressing and decompressing files, tar: The archival program, zip and unzip: Compressing and archiving together 3.7 Basic file attributes, ls -l: Listing file attributes, the -d option: Listing directory attributes 3.8 File ownership, File permissions, chmod: Changing file permissions, directory permission, Changing file ownership, chown: Changing file owner, chgrp: Changing group owner	Demonstration Presentations
4	TLO 4.1 Create and modify files using the vi editor. TLO 4.2 Use the line editing command. TLO 4.3 Use the navigation command in vi editor. TLO 4.4 Search a pattern in vi editor. TLO 4.5 Explain the Shell's Interpretive Cycle. TLO 4.6 Use of pattern matching and wildcards. TLO 4.7 Use of Shell variables.	**Unit - IV The vi Editor and Shell** 4.1 The vi Editor: vi Command, Input, and Line Editing Modes. 4.2 Creating, Saving and Quitting a File in vi, Managing Editing Modes in vi. 4.3 vi Editing Commands: Common Operations. 4.4 Navigation: Movement in the four direction (h, j, k and l), Word navigation (b, e and w), Moving to Line extremes (0, | and $), Scrolling ([Ctrl-f], [Ctrl-b], [Ctrl-d] and [Ctrl-u], Absolute Movement (G) 4.5 Searching for a pattern(/ and ?), Repeating the last pattern search (n and N) 4.6 The Shell: The Shell's interpretive cycle, Shell offerings, Pattern matching: The wild-cards, Escaping and quoting, Redirection: The three standard files, /dev/null and /dev/tty: Two special files 4.7 Pipes, tee: Creating a tee, Common substitution, Shell Variables	Demonstration Presentations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Execute Linux filters. TLO 5.2 Execute commands using regular expressions. TLO 5.3 Execute shell script programs.	**Unit - V Filters, Regular Expressions and Shell Programming** 5.1 Simple Filters: The sample database, pr: Paginating files, head: Displaying the beginning of a file, tail: Displaying the end of a file, cut: Splitting a file vertically, paste: Pasting files, sort: Ordering file, uniq: Locate repeated and nonrepeated lines, tr: Translating characters 5.2 Filters using regular expressions, grep: Searching for a pattern, Basic regular expression (BRE)- An introduction, Extended regular expressions (ERE) and egrep, sed: The stream editor 5.3 Essential Shell programming, Shell scripts, read: Making scripts interactive, Using command line arguments, exit and Exit status of command, The logical operators && and ||- Conditional executions 5.4 The if conditional, Using test and [ ] to evaluate expressions, the case conditional, expr: Computation and string handling, $0: Calling a script by different names 5.5 while: Looping, for: Looping with a list	Demonstration Presentations

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 * Install and configure the Linux operating system.	1	Install the Linux Operating System.	4	CO1
LLO 2.1 * Execute the following general-purpose Linux commands. 1) cal 2) date 3) echo 4) printf 5) bc 6) script 7) mailx 8) man 9) clear	2	Execute general purpose Linux commands.	2	CO2
LLO 3.1 * Execute the following general-purpose Linux commands. 1) passwd 2) who 3) whoami 4) uname 5) tty 6) stty 7) ps 8) kill 9) sleep	3	Execute general-purpose Linux commands.	2	CO2
LLO 4.1 * Execute the following file and Directory manipulation commands along with different options. 1) pwd 2) cd 3) mkdir 4) rmdir 5) ls 6) cat 7) rm 8) mv 9) cp	4	Execute file and Directory manipulation commands.	2	CO3
LLO 5.1 * Execute the following file and Directory manipulation commands along with different options. 1) touch 2) more 3) lp 4) file 5) wc 6) cmp 7) comm 8) diff 9) split	5	Execute file and Directory manipulation commands.	2	CO3
LLO 6.1 * Execute the following Linux commands for compressing decompressing and archiving files.1) gzip 2) gunzip 3) tar 4) tar -c 5) tar -x 6) zip 7) unzip	6	Execute Linux commands for compressing, decompressing, and archiving files.	2	CO3

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 7.1 * Execute the following commands to change file and directory permissions. 1) ls -l, ls -ld 2) chmod (with all options) 3) chown 4) chgrp	7	Change file and directory permissions.	2	CO3
LLO 8.1 * Use vi editor and execute all editor commands.	8	Use the vi editor to create and edit files.	2	CO4
LLO 9.1 Use wildcard characters (e.g., *, ?, []) to list and manipulate specific sets of files within the directory.	9	Use wildcard characters.	2	CO4
LLO 10.1 a) Create a text file with various lines of text. b) Create a complex pipeline by chaining multiple commands together using pipes (|).	10	Use of Pipes in Linux.	2	CO4
LLO 11.1 *Create input and output redirection in Linux.	11	Execute input and output redirection in Linux.	2	CO4
LLO 12.1 * Execute the following filters commands in Linux. 1) pr 2) head 3) tail 4) cut 5) paste 6) sort 7) uniq 8) tr	12	Execute the filters commands in Linux.	2	CO5
LLO 13.1 * Execute commands grep, egrep and sed in Linux.	13	Execute filters commands in Linux.	2	CO5
LLO 14.1 Read user input, exit and exit status commands, expr, and logical operators in shell scripts.	14	Execute shell scripts.	2	CO5
LLO 15.1 * Write the Shell script by using the "if" statement.	15	Execute the Shell script by using the if statement.	2	CO5
LLO 16.1 Write a Shell script by using the "while" loop.	16	Execute a Shell script by using the while loop.	2	CO5
LLO 17.1 Write a Shell script by using the "for"-loop.	17	Execute a Shell script by using the for loop.	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Not Applicable

Assignment

- Not Applicable

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Computer system with all necessary components like; motherboard, random access memory (RAM), read-only memory (ROM), internal hard disk drives, Mouse, Keyboard, and open-source operating System. (RedHat, Ubuntu etc.).	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction to Linux Operating System	CO1	4	0	0	0	0
2	II	General Purpose Utilities	CO2	6	0	0	0	0
3	III	File Management in Linux	CO3	7	0	0	0	0
4	IV	The vi Editor and Shell	CO4	7	0	0	0	0
5	V	Filters, Regular Expressions and Shell Programming	CO5	6	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Continuous assessment based on process and product related performance indicators. Each practical will be assessed considering

1) 60% weightage is to process
2) 40% weightage to product

Summative Assessment (Assessment of Learning)

- End Semester Examination, Lab Performance, Viva-voce.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	2	2	3	1	-	3			
CO2	3	-	1	3	1	-	3			
CO3	3	-	1	3	1	-	3			
CO4	3	2	2	3	1	-	3			
CO5	3	2	2	3	1	-	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Richard Petersen	Linux The Complete Reference	McGraw Hill, 6th edition ISBN Number 978-0071492478
2	Richard Blum	Linux command line and shell scripting	Wiley India ISBN Number 978-1118983843
3	Prof. Dayanand Ambawade	Linux Lab: Hands on Linux	Dreamtech Press ISBN Number 9789350040003
4	Sumitabha Das	Unix Concepts and Applications	McGraw-Hill Education (India) Pvt Limited, 2006 ISBN Number 978-0070635463

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://maker.pro/linux/tutorial/basic-linux-commands-for-beginners	Linux Basic Commands
2	https://www.guru99.com/must-know-linux-commands.html	Linux Basic Commands
3	https://www.shellscript.sh/	Shell Scripts and Programs
4	https://www.tutorialspoint.com/unix/shell_scripting.html	Shell Scripts and Programs examples
5	https://spoken-tutorial.org/tutorial	Online Course

Programme Name/s	**: Architecture Assistantship/ Automobile Engineering./ Artificial Intelligence/ Agricultural Engineering/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Architecture/ Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Fashion & Clothing Technology/ Dress Designing & Garment Manufacturing/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Food Technology/ Computer Hardware & Maintenance/ Hotel Management & Catering Technology/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Instrumentation/ Interior Design & Decoration/ Interior Design/ Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Medical Laboratory Technology/ Medical Electronics/ Production Engineering/ Printing Technology/ Polymer Technology/ Surface Coating Technology/ Textile Technology/ Electronics & Computer Engg./ Travel and Tourism/ Textile Manufactures**
Programme Code	**: AA/ AE/ AI/ AL/ AN/ AO/ AT/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DC/ DD/ DE/ DS/ EE/ EJ/ EP/ ET/ EX/ FC/ HA/ HM/ IC/ IE/ IF/ IH/ IS/ IX/ IZ/ LE/ ME/ MK/ ML/ MU/ PG/ PN/ PO/ SC/ TC/ TE/ TR/ TX**
Semester	**: Second**
Course Title	**: SOCIAL AND LIFE SKILLS**
Course Code	**: 312003**

I. RATIONALE

Rationale : Life skills can be defined as abilities that enable humans to deal effectively with the demands and challenges of life. Social skills are a subset of life skills that are needed for successful, healthy relationships to easily adapt when moving from one social situation to the next. They help regulate our emotions effectively and develop enduring, supportive relationships, we're happier and healthier. This is why developing life skills and eventually social skills is key not only to being successful in life, it's key for our health and well-being. Thus, Teaching of Social and life skills provide students with essentials of knowing , understanding attitudes, values, morals ,social skills and better equip them to handle stress and build their self efficacy, self esteem and self confidence.

Note : The course offers five different alternatives(modules) for achieving above outcomes . Students must complete any one module from the following given options.

a. MODULE-I : Unnat Maharashtra Abhiyan (UMA)
b. MODULE-II : National Service Scheme (NSS)

c. MODULE-III : Unniversal Human Values
d. MODULE-IV: Value Education (Unnati Foundation)
e. MODULE-V : Financial Literacy (NABARD)

The institute can choose to offer any one MODULE to the groups of the students by taking into consideration the resources required and resources available in the institute . Different group of students maybe offered different MODULE based on their choices .

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Exhibit psychosocial competencies, workplace ethics, resilience, positive attitude , integrity and self-confidence

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Develop ability to adapt to new challenges.
- CO2 - Manage emotions effectively.
- CO3 - Follow workplace ethics and practices
- CO4 - Manage time Effectively.
- CO5 - Increased self confidence to handle stress.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
312003	SOCIAL AND LIFE SKILLS	SFS	VEC	-	-	-	2	2	1	-	-	-	-	-	-	-	-	-	50	20	50

Total IKS Hrs for Sem. : Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Explain developmental needs and connection of various stakeholders TLO 1.2 Enlist the local problems TLO 1.3 Design a methodology for fieldwork TLO 1.4 Select the attributes of engineering and social system for measurement, quantification, and documentation TLO 1.5 Measure & quantify the quantities / systems parameters TLO 1.6 Write a report using information collected tStudy the data collected from fieldwork and conclude the observations	**Unit - I MODULE I : Activities Under Unnat Maharashtra Abhiyan (UMA)** 1.1 Introduction to Societal Needs and respective stakeholders : Regional societal issues that need engineering intervention 1.2 Multidisciplinary approach-linkages of academia, society and technology 1.3 Stakeholders' involvement 1.4 Introduction to Important secondary data sets available such as census, district economic surveys, cropping pattern, rainfall data, road network data etc 1.5 Problem Outline and stakeholders : Importance of activity and connection with Mapping of system components and stakeholders (engineering / societal) 1.6 Key attributes of measurement 1.7 Various instruments used for data collection - survey templates, simple measuring equipments 1.8 Format for measurement of identified attributes/ survey form and piloting of the same 1.9 Fieldwork : Measurement and quantifications of local systems such as agriculture produce, rainfall, Road network, production in local industries, Produce /service which moves from A to B 1.10 Analysis and Report writing Report writing containing- 1. Introduction of the topic 2. Data collected in various formats such as table, pie chart, bar graph etc 3. Observations of field visits and data collected.	i) Field visit ii) Field work iii) Expert lectures

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Adoption of Village or Slum TLO 2.2 Survey and Problem Identification TLO 2.3 Conduct Project / Programs in the selected village / slum TLO 2.4 Undertake Special Camping Programme	**Unit - II MODULE II : National Service Scheme (NSS)** 2.1 Contacting Village/Area Leaders 2.2 Primary socio economic survey of few villages in the vicinity of the institute. 2.3 Selection of the village for adoption - conduct of activities 2.4 Comprehensive Socio Economic Survey of the Village/Area 2.5 Identification of Problem(s) 2.6 Dissemination of information about the latest developments in agriculture, watershed management, wastelands development, non-conventional energy, low cost housing, sanitation, nutrition and personal hygiene, schemes for skill development, income generation, government schemes, legal aid, consumer protection and allied fields. 2.7 A liaison between government and other development agencies for the implementation of various development schemes in the selected village / slum.	(i) Field visit (ii) Field work (iii) Expert lectures
3	TLO 3.1 Love and Compassion (Prem and Karuna) TLO 3.2 Truth (Satya) TLO 3.3 Non-Violence (Ahimsa) TLO 3.4 Righteousness (Dharma) TLO 3.5 Peace (Shanti) TLO 3.6 Service (Seva) TLO 3.7 Renunciation (Sacrifice) Tyaga TLO 3.8 Gender Equality and Sensitivity	**Unit - III MODULE-III : Universal Human Values** 3.1 Love and Compassion (Prem and Karuna): Introduction, Practicing Love and Compassion (Prem and Karuna) 3.2 Truth (Satya) : Introduction, Practicing Truth (Satya) 3.3 Non-Violence (Ahimsa) : Introduction, Practicing Non-Violence (Ahimsa) 3.4 Righteousness (Dharma) : Introduction, Practicing Righteousness (Dharma) 3.5 Peace (Shanti) : Introduction, Practicing Peace (Shanti) 3.6 Service (Seva) : Introduction, Practicing Service (Seva) 3.7 Renunciation (Sacrifice) Tyaga : Introduction, Practicing Renunciation (Sacrifice) Tyaga 3.8 Gender Equality and Sensitivity: Introduction, Practicing Gender Equality and Sensitivity	i) Lectures ii) Demonstration iii) Case Study iv) Role Play v) Observations vi) Portfolio Writing vii) Simulation viii) Motivational talks by Practitioners ix) Site/Industry Visit

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
4	TLO 4.1 Puntuality TLO 4.2 Cleanliness, Hygiene and Orderliness TLO 4.3 Responsibility TLO 4.4 Gratitude and Appreciations TLO 4.5 Determination & Persistence TLO 4.6 Respect TLO 4.7 Team Spirit TLO 4.8 Caring & Sharing TLO 4.9 Honesty TLO 4.10 Forgive and Forget	**Unit - IV MODULE-IV: Value Education (Unnati Foundation)** 4.1 Punctuality, Icebreaker and Simple Greeting, Understanding & Managing Emotions, Introducing Self, The power of a Positive Attitude, Talking about one's Family, Talking about one's Family, Making a Positive Impression, Give word list for a Word based 4.2 Cleanliness , Hygiene and Orderliness , Likes and Dislikes, Developing Confidence in Self and Others, Strengths and Weaknesses, Listening Skills , Greeting gestures, Gender Equality and Sensitivity 4.3 Responsibility, OCSEM- Visual Comprehension and Word Based Learning, Goal Setting – Make it happen, Follow, Like & Share Unnati Social Media - Facebook / Instagram/ Twitter Introducing Others, Time Management, Talking about the daily routine, Money Management 4.4 Gratitude and Appreciation , Asking Simple Questions & Asking for the price , Stress Management, Student Referral process ,Comprehending & Paraphrasing Information, A Plate of Rice and Dignity of Labour, Topics for Public Speaking, Placement Process , OCSEM-E-Newspaper, Critical Thinking to overcome challenges 4.5 Determination and Persistence, Guiding and Giving Directions, Language Etiquette & Mannerism, . Unnati Philosophy , b. Unnati Branding - Follow, Like & Share Unnati Social Media - Facebook / Instagram/ Twitter, Simple instructions to follow procedures, Assertiveness, Give topics for Debate, Describing a person/Objects, Refusal Skills, Word List for Word based Learning 4.6 Respect, Comparing , OCSEM - Public Speaking, Student referral process, Attending a phone call, Being a Good Team Player , Placement Process, At a Restaurant, Workplace ethics 4.7 Team Spirit, Inviting someone, OCSEM - Picture Reading & Word, a. Unnati Philosophy & b. Unnati Branding - Follow, Like & Share Unnati Social Media - Facebook / Instagram/ Twitter, Apologizing, Apologizing, Dealing effectively with Criticism, Introduce Importance of Self Learning	i) Video Demonstrations ii) Flipped Classroom iii) Case Study iv) Role Play v) Collaborative learning vi) Cooperative Learning vii) Chalk-Board

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
		and upskilling 4.8 Caring and Sharing , Handling Customer queries, Flexibility & Adaptibility, Student referral process, Writing a Resume, OCSEM-Public Speaking, Placement Process, Meditation/ Affirmation & OCSEM-Debate, Introduce Certif-ID, how to create Certif-ID Project , 4.9 Honesty, Email etiquette & Official Email communication, Alcohol & Substance use & abuse, Describing a known place , Leadership Skills, Describing an event, OSCEM-Picture Reading & Visual Comprehension 4.10 Forgive and Forget, Facing and Interview, OSCEM-Public Speaking , Attending a telephonic/Video interview & Mock Interview , Affirmation , Pat-a-Back & Closure (Valediction , Unnati Branding, Student Testimonials), Meditation/ Affirmation & Sponsor connect (Speak to UNXT HO)	
5	TLO 5.1 Literacy About Savings and Investments TLO 5.2 Literacy About Financial Planning TLO 5.3 Literacy About Transactions TLO 5.4 Literacy About Income, expenditure and budgeting TLO 5.5 Literacy About Inflation TLO 5.6 Literacy About Loans TLO 5.7 Literacy About the Importance of Insurance TLO 5.8 Literacy About the Dos and Donts in finances	**Unit - V MODULE-V : Financial Literacy** 5.1 Introduction - Life Goals and financial goals 5.2 Savings and Investments - Three pillars of investments, Popular asset classes, Government schemes, Mutual Funds, Securities markets (Shares and bonds), Gold, Real Estate, Do's and Don'ts of investments 5.3 Retirement planning 5.4 Cashless transactions 5.5 Income, expenditure and budgeting – Concepts and Importance 5.6 Inflation- Concept, effect on financial planning of an individual 5.7 Loans – Types, Management of loans, Tax benefits 5.8 Insurance – Types, Advantages, selection 5.9 Dos and Donts in Financial planning and Transactions	i) Online/Offline Mode of Instructions ii) Video Demonstrations iii) Presentations iv) Case Study v) Chalk-Board vi) Collaborative learning

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES : NOT APPLICABLE.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Suggestive list of activities during Regular as well as Special Camping (NSS Activities)

- Following list is only an illustrative list of the type of activities that can be undertaken. Under the programme it would be open to each NSS Unit to undertake one of these programmes or any other activity which may seem desirable to them according to local needs. The NSS Unit should aim at the integrated development of the area selected for its operation which could be a village or a slum. It has also to be ensured that at least a part of the programme does involve manual work.

(a) Environment Enrichment and Conservation:
The activities under this sub-theme would inter-alia, include:
(i) plantation of trees, their preservation and upkeep
(ii) Construction & maintenance of village streets, drains
(iii) Cleaning of village ponds and wells;
(iv) Popularization and construction of Gobar Gas Plants, use of non-conventional energy;
(v) Disposal of garbage & composting;
(vi) Prevention of soil erosion and work for soil conservation,
(vii) Watershed management and wasteland development
(viii) Preservation and upkeep of monuments, and creation of consciousness about the preservation of cultural heritage among the community.

(b) Health, Family Welfare and Nutrition Programme:

(i) Programme of mass immunization;
(ii) Working with people in nutrition programmes with the help of Home Science and medical college students;
(iii) Provision of safe and clean drinking water;
(iv) Integrated child development programmes;
(v) Health education, AIDS Awareness and preliminary health care.
(vi) Population education and family welfare programme;
(vii) Lifestyle education centres and counselling centres.
© Programmes aimed at creating an awareness for improvement of the status of women: (i) programmes of educating people and making them aware of women's rights both constitutional and legal;
(ii) creating consciousness among women that they too contributed to economic and social well-being of the community;
(iii) creating awareness among women that there is no occupation or vocation which is not open to them provided they acquire the requisite skills; and
(iv) imparting training to women in sewing, embroidery, knitting and other skills wherever possible.

(d) Social Service Programmes:

(i) work in hospitals, for example, serving as ward visitors to cheer the patients, help the patients, arranging occupational or hobby activities for long term patients; guidance service for out-door-patients including guiding visitors about hospital's procedures, letter writing and reading for the patients admitted in the hospital; follow up of patients discharged from the hospital by making home visits and places of work, assistance in running dispensaries etc.
(ii) work with the organisations of child welfare;
(iii) work in institutions meant for physically and mentally handicapped;
(iv) organising blood donation, eye pledge programmes;

(v) work in Cheshire homes, orphanages, homes for the aged etc.;
(vi) work in welfare organisations of women;
(vii) prevention of slums through social education and community action;

(e) Production Oriented Programmes:

(i) working with people and explaining and teaching improved agricultural practices;
(ii) rodent control land pest control practices;
(iii) weed control;
(iv) soil-testing, soil health care and soil conservation;
(v) assistance in repair of agriculture machinery;
(vi) work for the promotion and strengthening of cooperative societies in villages;
(vii) assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
(viii) popularisation of small savings and assistance in procuring bank loans

(f) Relief & Rehabilitation work during Natural Calamities:

(i) assisting the authorities in distribution of rations, medicine, clothes etc.;
(ii) assisting the health authorities in inoculation and immunisation, supply of medicine etc.;
(iii) working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;
(iv) assisting and working with local authorities in relief and rescue operation;
(v) collection of clothes and other materials, and sending the same to the affected areas;

(g) Education and Recreations: Activities in this field could include:

(i) adult education (short-duration programmes);
(ii) pre-school education programmes;
(iii) programmes of continuing education of school drop outs, remedial coaching of students from weaker sections;
(iv) work in crèches;
(v) participatory cultural and recreation programmes for the community including the use of mass media for instruction and recreation, programmes of community singing, dancing etc.;
(vi) organisation of youth clubs, rural land indigenous sports in collaboration with Nehru Yuva Kendras;
(vii) programmes including discussions on eradications of social evils like communalism, castism, regionalism, untouchability, drug abuse etc.;
(viii) non- formal education for rural youth and
(ix) legal literacy, consumer awareness.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Simple engineering measurement devices GPS data collection tools GIS open source softwares- Google Earth and QGIS MS office suite	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

(Specification Table) : NOT APPLICABLE

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Formative assessment (Assessment for Learning) Report and presentation of fieldwork activities, Self-Learning (Assignment)

Summative Assessment (Assessment of Learning)

XI. SUGGESTED COS - POS MATRIX FORM : NOT APPLICABLE

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	IRAP, Hyderabad, CTARA, IIT Bombay and UNICEF, Mumbai	Compendium of Training Materials for the Capacity Building of the Faculty and Students of Engineering Colleges on 'IMPROVING THE PERFORMANCE OF RURAL WATER SUPPLY AND SANITATION SECTOR IN MAHARASHTRA' Districts Economic survey reports	UNICEF
2	Central Public Health and Environmental Engineering Organisation	Manual on Water Supply and Treatment	Ministry of Urban Development, New Delhi
3	Specifications And Standards Committee	Indian Standards (IS) Codes and Indian Roads Congress (IRC) Codes	Bureau of Indian Standards and The Indian Road Congress
4	Prepared by each district administration	Districts Economic survey reports	Govt. of Maharashtra
5	Local college students, UMA staffs	Sample Case Studies on UMA website	IITB-UMA team

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://gr.maharashtra.gov.in/Site/Upload/Government%20Resolutions/English/201601131501523808.pdf	Government Resolution of Government of Maharashtra regarding Unnat Maharashtra Abhiyan
2	https://gr.maharashtra.gov.in/Site/Upload/Government%20Resolutions/English/201606151454073708.pdf	Government Resolution of Government of Maharashtra regarding Unnat Maharashtra Abhiyan Guidelines

Sr.No	Link / Portal	Description
3	https://censusindia.gov.in/census.website/	A Website of Census of India
4	https://gsda.maharashtra.gov.in/english/	A Website of Groundwater Survey and Development Agency, GoM
5	https://mrsac.gov.in/MRSAC/map/map	A Website where district-wise maps showcasing different attributes developed by Maharashtra Remote Sensing Applications Centre.
6	https://ejalshakti.gov.in/jjmreport/JJMIndia.aspx	A Website of Jal Jivan Mission, Government of India
7	https://cpcb.nic.in/	A Website of Central Pollution Control Board, Government of India
8	http://www.mahapwd.com/#	A Website of Public Works Department, GoM
9	http://tutorial.communitygis.net/	A Website for GIS data sets developed by Unnat Maharashtra Abhiyan
10	https://youtu.be/G71maumVZ1A?si=TzDTxKUpLYaRos7U	A video record of lecture by Prof. Milind Sohoni, IIT Bombay, on Engineering, Development and Society
11	https://youtu.be/TUcPNwtdKyE?si=wnSWrhGc9dJTC-ac	A keynote talk by Prof. Milind Sohoni, IIT Bombay, on Interdisciplinary Engineering: The Road Ahead
12	https://youtu.be/mKJj6j_1gWg?si=ajE8s4lfB2OM63Ng	A TED talk by Prof. Milind Sohoni, IIT Bombay, on Vernacular Science: The Science of Delivery
13	https://www.ugc.gov.in/pdfnews/4371304_LifeSKill_JeevanKaushal_2023.pdf	UHV: UGC Course on life skils. Unit 4 i.e. Course 4 is to be referred
14	https://nss.gov.in/	NSS : Know about the NSS Scheme and details