DIPLOMA CURRICULUM OF
COMPUTER SCIENCE AND ENGINEERING
(THIRD YEAR)
(6th Semester)

(To be implemented from 2026-27)

Prepared by;

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SEMESTER – VI

				Study Scheme				Evaluation Scheme					
								Theory		Practical			
SL. No	Category of Course	Code No	Course Title	Pre-requi site	Contact Hours/ week			End Exam	Progressive Assessment	End Exam	Progressive Assessment	Total Marks	Credits
					L	T	P						
1	**Program Core**	CSEPC302 TH1	Software Engineering		3	0	0	70	30	-	-	100	3
2		CSEPC304 PR1	Software Engineering Lab		0	0	4	-	-	15	35	50	2
3	**Humanities and Social Science**	HS302 TH2	Entrepreneurship and Start ups		4	0	0	70	30	-	-	100	4
4	**Open Elective**	OE302 (Any one) TH3	Open Elective-II (A) Project Management (B) Disaster Management (C) Artificial Intelligence		3	0	0	70	30	-	-	100	3
5		OE 304 (Any one) TH4	Open Elective-III (A) Engineering Economics & Accountancy (C) Sustainable Development (D) Robotics		3	0	0	70	30	-	-	100	3
6	**Mandatory**	AU302 TH5	Indian Constitution		2	0	0	0	0	-	-	0	0
7	**Major Project**	PR 302 PR2	Major Project		0	0	6	-	-	100	100	200	3
8	**Seminar**	SE302	Seminar		0	0	2	-	-	30	70	100	1
	TOTAL				15	0	12	280	120	145	205	750	19

TEACHING AND EVALUATION SCHEME FOR SIXTH SEMESTER COMPUTER SCIENCE AND ENGINEERING

All Audit (mandatory) courses will have assessment, but will have no credit.

SEMESTER – VI

TH1- SOFTWARE ENGINEERING

L	T	P			
3	0	0		**Course Code: CSEPC 302**	
Total Contact Hours				**Theory Assessment**	
Theory		: 45 Hrs		End Term Exam	: 70
			Total Marks: 100	Progressive Assessment	: 30
Pre-Requisite		: Nil			
Credit		: 3		Category of Course	: PC

RATIONALE:

This course introduces students to Software Engineering principles, covering the software development lifecycle, process models, design, coding, testing, and project management. It equips learners with practical skills and industry-standard tools to develop, test, and maintain high-quality software efficiently. By the end, students will be able to apply best practices in software development and project management to build reliable and scalable applications.

LEARNING OUTCOMES:

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

• Describe the different software development lifecycle models, including Agile and Waterfall.
• Implement effective coding, debugging, and UI design techniques in software development projects.
• Compare various software architectural styles and their impact on system performance and scalability.
• Assess software quality through different testing techniques, including unit, integration, and stress testing.
• Develop a version-controlled software project using Git and apply configuration management best practices.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Software Engineering:** Why Software Engineering, Lifecycle, Major Steps in Software Lifecycle, Process Models.	4
II	**Modeling the Process and Life Cycle:** Meaning of Process, Software Process Models, Tools and Techniques of Process Modeling, Practical Process Modeling.	6

III	**Planning and Managing the Project:** Tracking Progress, m a n a g i n g Project Personnel, Effort Estimation, Risk Management, The Project Plan, Process Models and Project Management.	7
IV	**Development Activities:** Requirements Gathering and Analysis, Design Concepts, Software architecture and Architectural styles, Basic UI design, Effective Coding and Debugging techniques.	8
V	**Software Testing**: Basics, Unit, Integration, System and Acceptance Testing, Introduction to various testing techniques (e.g. Stress testing), Writing and executing test cases, Quality Assurance.	8
VI	**Version Management:** Project management concepts, Configuration and Release Management, Version Control and its tools (Git), Release Planning, Change Management, Software Maintenance, Project Metrics.	7
VII	**Maintaining the System:** The Changing System, The Nature of Maintenance, Maintenance Problems, Measuring Maintenance Characteristics, Maintenance Techniques and Tools, Software Rejuvenation.	5

REFERENCES:

1.	Software Engineering – A Practitioner's Approach, 7th Edition, Roger Pressman.
2.	Software engineering, Ian Sommerville, Pearson Education
3.	An Integrated Approach to Software Engineering, Pankaj Jalote, Springer Verlag
4.	Software Engineering, Nasib Singh Gill, Khanna Book Publishing Co. India.
5.	Software Engineering, K. K. Agarval, Yogesh Singh, New Age International Publishers
6.	Software Engineering, Rajib Mall, 5th ed. PHI Learning Pvt. Ltd.

PR1- SOFTWARE ENGINEERING LAB

L	T	P			
0	0	4		**Course Code: CSEPC 304**	
Total Contact Hours				**Practical Assessment**	
Practical		: 60 Hrs	**Total Marks: 50**	End Term Exam	: 15
				Progressive Assessment	: 35
Pre-Requisite		: Nil			
Credit		: 2		Category of Course	: PC

RATIONALE:

Software Engineering is essential for designing, developing, and maintaining high-quality software systems. This course provides a structured approach to software development, covering requirement analysis, design, coding, testing, and project management. Students will gain hands-on experience with software engineering tools, testing techniques, and version control systems.

LEARNING OUTCOMES:

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

- Describe software development life cycle models and software engineering principles.
- Apply requirement analysis, design methodologies, and architectural patterns in software development.
- Develop software projects using Agile practices, version control tools, and quality assurance techniques.
- Implement software testing strategies, create test cases, and ensure software reliability and maintainability.
- Utilize project management tools for configuration, release management, and software metrics evaluation.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Identify and document the phases of SDLC for a given case study.	6
II	Compare Waterfall, Agile, and Iterative models; develop a simple project using Agile methodology.	6
III	Perform requirement gathering and create an SRS document for an online shopping system.	6
IV	Create UML Use Case and Data Flow Diagrams (DFD) for a Library Management System.	6
V	Develop a basic application following architectural styles like Layered or MVC.	6

VI	Design a basic user interface for an online banking system using Figma or HTML/CSS.	6
VII	Write and execute unit test cases using JUnit or PyTest.	8
VII	Perform commit, branch, merge, and push operations using GitHub.	8
IX	Track changes and create release notes using Git and GitHub projects.	8

REFERENCES:

1.	Ian Sommerville, Software Engineering, 10th Edition, Pearson, Boston, 2015.
2.	Roger S. Pressman, Software Engineering: A Practitioner's Approach, 8th Edition, McGraw Hill, New York, 2014.
3.	Pankaj Jalote, Software Engineering: A Precise Approach, 1st Edition, Wiley, New Delhi, 2010.
4.	Rajib Mall, Fundamentals of Software Engineering, 5th Edition, PHI Learning, New Delhi, 2018.
5.	Shari Lawrence Pfleeger & Joanne M. Atlee, Software Engineering: Theory and Practice, 4th Edition, Pearson, Boston, 2010.

TH2-Entrepreneurship and start ups

L	T	P
4	0	0

Total Contact Hours	
Theory	: 60Hrs

Pre Requisite	: Nil

Credit	4

Total Marks: 100

Course Code: HS302	
Theory Assessment	
End Term Exam	70
Progressive Assessment	30
Category of Course: HSS	

RATIONALE:

Entrepreneurship and Startups are introduced in curriculum to develop the entrepreneurship traits among the students before they enter into the professional life exposing themselves to and interacting with entrepreneurship and startup eco-system, student will develop and entrepreneurial mind set. It is important because they can help the students to develop the skills and knowledge needed to start and grow businesses and understand how to turn their ideas into successful ventures.

LEARNING OUTCOMES:

After the completion of the course, the student shall be able to

• Develop Entrepreneurial spirit and resourcefulness.
• Familiar with various uses of human resources for earning dignified means of living.
• Explain the concept and process of entrepreneurship - its contribution and role in the growth and development of individuals and the nation.
• Define entrepreneurial quality, competency, and motivation.
• Learn the process and skills of creation and management of entrepreneurial ventures.

DETAILED COURSE CONTENTS

Unit	Topic/Subtopic	Hours
I	Introduction to Entrepreneurship and Start-Ups: Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation; Types of Business Structures, Similarities/differences between entrepreneurs and managers.	12
II	Business Ideas and their implementation: Discovering ideas and visualizing the business, Activity map, Business Plan.	08
III	Idea to Start-up: Market Analysis- Identifying the target market, Competition evaluation and Strategy Development, Marketing and accounting, Risk analysis.	10
IV	Management: Company's Organization Structure, Recruitment and management of talent, financial organization and management.	12

V	Financing and Protection of Ideas: Financing methods available for start-ups in India, Communication of Ideas to potential investors – Investor Pitch, Patenting and Licenses	10
VI	Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy.	8
	Total	60

REFERENCES:

1.   The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company, Steve Blank and Bob Dorf K & S Ranch, ISBN – 978-0984999392.

2.   The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Eric Ries, Penguin UK, ISBN – 978-0670921607.

3.   Demand: Creating What People Love Before They Know They Want It, Adrian J. Slywotzky with Karl Weber, Headline Book Publishing, ISBN – 978-0755388974.

4.   The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business, Clayton M. Christensen, Harvard business ISBN: 978-142219602.

Websites:

1.   https://www.fundable.com/learn/resources/guides/startup

2.   https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure/

3.   https://www.finder.com/small-business-finance-tips

4.   https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

TH3A- PROJECT MANAGEMENT

L	T	P		Course Code: OE302A	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45 Hrs.		End Term Exam	: 70
Tutorial		: 0		Progressive Assessment	: 30
Pre Requisite	**: Nil**				
Credit	**: 3**			Category of Course: OE	

RATIONALE

The aim of this course is to develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how to achieve the goals. The students will develop an understanding of key project management skills and strategies.

LEARNING OUTCOMES

On successful completion of the course, students will be able to:
- List out the importance of projects and its phases.
- Define projects from marketing, operational and financial perspectives.
- Analyze projects based on discount and non-discount methods.
- Construct network diagrams for planning and execution of a given project.
- Apply crashing procedures for time and cost optimization.

DETAILED COURSE CONTENT

UNIT	TOPIC/SUB-TOPIC	HRS.
I.	**CONCEPT OF A PROJECT**: Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time) project priority matrix- work break down structure.	9
II.	**CAPITAL BUDGETING PROCESS:** Planning- Analysis-Selection-Financing-Implementation-Review. Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis	9
III.	**FINANCIAL ESTIMATES AND PROJECTIONS:** Cost of projects-means of financing-estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break-even analysis.	9

IV.	**BASIC TECHNIQUES IN CAPITAL BUDGETING**: Non discounting and discounting methods- payback period- Accounting rate of return- net present value-Benefit cost ratio-internal rate of return. Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects**.**	9
V.	**PROJECT ADMINISTRATION**: Progress payments, expenditure planning, project scheduling and network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade off. Concepts and uses of PERT cost as a function of time, Project Evaluation and Review Techniques/cost mechanisms. Determination of least cost duration. Post project evaluation. Introduction to various Project management soft wares.	9

REFERENCES:

- Project planning, analysis, selection, implementation and review – Prasannachandra – Tata McGraw Hill
- Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson - McGraw Hill
- Project management - David I Cleland - Mcgraw Hill International Edition, 1999
- Project Management – Gopala krishnan – Mcmillan India Ltd.
- Project Management-Harry-Maylor-Peason Publication

TH3B- DISASTER MANAGEMENT

L	T	P
3	0	0

Total Contact Hours	
Theory	: 45 Hrs.
Tutorial	: 0

Pre Requisite	**: Nil**
Credit	**: 3**

Total Marks: 100

Course Code: OE302B	
Theory Assessment	
End Term Exam	: 70
Progressive Assessment	: 30
Category of Course: OE	

RATIONALE

Disasters can be caused by both natural and man-made factors. They cannot be anticipated, and once they do, they must be handled with maturity, subtlety, and responsibility. Numerous immediate decisions must be made, and relief efforts must be planned and managed. Thus this course provides to the civil engineers, a proper knowledge regarding the disasters along with how they affect the environment and living things.

LEARNING OUTCOMES

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

- Use of basic information on various types of disasters to control the disaster
- Take the precautions during various disasters
- Decide first action to be taken under various disasters
- Communicate with others in India which are dealing with disasters
- Select IT tools to help in disaster management

DETAILED COURSE CONTENT

UNIT NO.	CONTENT	TIME ALLOTTED (HOURS)
UNIT-I	**Understanding Disaster** • Understanding the Concepts and definitions of Disaster, Hazard, • Vulnerability, Risk, Capacity • Disaster and Development, and disaster management	**05**
UNIT-II	**Types, Trends, Causes, Consequences and Control of Disasters** • Geological Disasters (earthquakes, landslides, tsunami, • mining); Hydro-Meteorological Disasters (floods, • cyclones, lightning, thunder-storms, hail storms, • Avalanches, droughts, cold and heat waves) Biological (3rd yr)/First Draft/May, 2023. Disasters (epidemics, pest attacks, forest fire); • Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.	**10**

UNIT-III	**Disaster Management Cycle and Framework**	10
	• Disaster Management Cycle – Paradigm Shift in Disaster Management.	
	• Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness.	
	• During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation –	
	• Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Frame-work of Action	
UNIT-VI	**Disaster Management in India**	10
	• Disaster Profile of India – Mega Disasters of India and Lessons Learnt.	
	• Disaster Management Act 2005 – Institutional and Financial Mechanism,	
	• National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies	
UNIT-V	**Applications of Science and Technology for Disaster Management**	10
	• Geo-informatics in Disaster Management (RS, GIS, GPS and RS).	
	• Disaster Communication System (Early Warning and Its Dissemination).	
	• Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non-Structural Mitigation of Disasters Institutions for Disaster Management in India	
	TOTAL	**45**

REFERENCES:

- Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
- Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
- Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
- 4. Alexander, David, Natural Disasters, Kluwer Academic London
- Ghosh, G. K., Disaster Management, A P H Publishing Corporation
- Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

TH3C- ARTIFICIAL INTELLIGENCE

L	T	P		Course Code: OE302C
3	0	0		
Total Contact Hours				**Theory Assessment**
Theory		: 45 Hrs.	**Total Marks: 100**	End Term Exam : 70
Tutorial		: 0		Progressive Assessment : 30
Pre Requisite		**: Nil**		
Credit		**: 3**		Category of Course: OE

RATIONALE:

Artificial Intelligence (AI) empowers machines to mimic human intelligence, enabling tasks such as decision-making, problem-solving, and learning. It drives innovation across industries, from healthcare to robotics, by automating complex processes and uncovering insights from data. Learning AI equips students with cutting-edge skills to build intelligent systems and shape the future of technology.

LEARNING OUTCOMES:

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

- Explain key concepts in Artificial Intelligence such as intelligent agents, search algorithms (uninformed, informed, local), and neural network architectures.
- Explain the principles of decision-making models, including Markov Decision Processes and reinforcement learning, and their applications in AI.
- Implement search algorithms, logic-based agents, and neural network architectures (feed forward, CNN, RNN) to solve AI-related problems.
- Analyze the performance of different neural network architectures and optimization techniques (e.g., gradient descent, Adam) to improve model accuracy and efficiency.
- Develop intelligent agents and neural network models for real-world applications, applying advanced learning techniques and optimization methods.

DETAILED COURSE CONTENT:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Fundamentals of Artificial Intelligence:** Introduction: History and foundations of AI Intelligent Agents, Uninformed Search; informed Search; Local Search; Adversarial Search, Constraint Satisfaction Problems	6
II	**AI:** Logic, Planning, and Knowledge Representation, Logical Agents, First Order Logic and its Inference, Classical Planning, Knowledge Representation	6
III	**Bayesian Network:** Introduction to Probability, Conditional Probability, Conditional Independence, Bayesian Network, Representation Approximate Inference in Bayesian Networks, Learning in Bayesian Network.	6
IV	**Decision Making:** Decision Theory, Markov Decision Processes, Reinforcement Learning	6
V	**Neural Networks:** Neural Networks: Biological neurons vs. artificial neurons; History and development of neural networks, Neurons, weights, biases, Activation functions (Sigmoid, ReLU, Tanh, Softmax).	7

VI	**Neural Network Architectures:** Feedforward Neural Networks (Single-layer and multilayer architectures), Convolutional Neural Networks (CNNs, Filters, pooling, and feature maps), Recurrent Neural Networks (RNNs, Long Short-Term Memory (LSTM)), Learning and Training - Perceptron and its limitations; Multilayer perceptron (MLP) and Backpropagation; Overfitting and regularization	7
VII	**Optimization Techniques:** Gradient Descent and its Variants (Stochastic Gradient Descent (SGD), Momentum-based optimization, Adam optimizer), Learning Rate and Convergence - Impact of learning rate on training.	7

REFERENCES:

1.	Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2nd Edition, Pearson/Prentice Hall, New Jersey, 2003.
2.	M.C. Trivedi, A Classical Approach to Artificial Intelligence, 1st Edition, Khanna Publishing House, New Delhi, 2018.
3.	V.K. Jain, Machine Learning, 1st Edition, Khanna Publishing House, New Delhi, 2018.
4.	Ethem Alpaydin, Introduction to Machine Learning, 2nd Edition, MIT Press, Cambridge, 2014.
5.	Vinod Chandra S.S. and Anand Hareendran S., Artificial Intelligence and Machine Learning, PHI Learning, New Delhi, 2014.

TH4A- ENGINEERING ECONOMICS AND ACCOUNTANCY

L	T	P		
3	0	0		**Course Code: OE304A**
Total Contact Hours				**Theory Assessment**
Theory	: 45 Hrs.		**Total Marks: 100**	End Term Exam : 70
Tutorial	: 0			Progressive Assessment : 30
Pre Requisite	**: Nil**			
Credit	**: 3**			Category of Course : OE

RATIONALE

Engineering Economics and Accountancy plays crucial role in the economic aspects of engineering. This course ensures that the budding engineers to facilitate the process of economic decision making and also to acquaint knowledge on basic financial management aspects. Also, they will be able to develop the skills to analyze financial statements.

LEARNING OUTCOMES

On successful completion of the course, students will be able to:

- Identify various aspects of managerial economics
- Describe the mechanism of demand and supply
- Interpret various concepts of production and cost analysis
- Explain the different components of pricing
- Distinguish the details of financial accounting

DETAILED COURSE CONTENT

UNIT	TOPIC/SUB-TOPIC	ALLOTTED TIME (HRS.)
I.	**INTRODUCTION:** Managerial Economics; Relationship with other disciplines; Firms: Types, objectives and goals; Managerial decisions; Decision analysis.	8
II.	**DEMAND & SUPPLY ANALYSIS:** Demand; Types of demand; Determinants of demand; Demand function; Demand elasticity; Demand forecasting; Supply; Determinants of supply; Supply function; Supply elasticity.	12
III.	**PRODUCTION AND COST ANALYSIS:** Production function; Returns to scale; Production optimization; Least cost input; Isoquants; Managerial uses of production function; Cost Concepts; Cost function; Types of Cost; Determinants of cost; Short run and Long run cost curves; Cost Output Decision; Estimation of Cost.	10

IV.	**PRICING:** Determinants of Price; Pricing under different objectives and different market structures; Price discrimination; Pricing methods in practice; Role of Government in pricing control.	7
V.	**FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT):** Balance sheet and related concepts; Profit & Loss Statement and related concepts; Financial Ratio Analysis; Cash flow analysis; Funds flow analysis; Comparative financial statements; Analysis & Interpretation of financial statements; Investments; Risks and return evaluation of investment decision; Average rate of return; Payback Period; Net Present Value; Internal rate of return,	8

REFERENCES:

1. Premvir Kapoor, Sociology & Economics for Engineers, Khanna Publishing House, New Delhi, 2018
2. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.
3. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.
4. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
5. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007.
6. Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson South Western, 4th Edition, 2001.

TH4C- SUSTAINABLE DEVELOPMENT

L	T	P
3	0	0

Total Contact Hours	
Theory	: 45 Hrs.
Tutorial	: 0

Pre Requisite	: Nil
Credit	: 3

Total Marks: 100

Course Code: OE304C

Theory Assessment	
End Term Exam	: 70
Progressive Assessment	: 30
Category of Course : OE	

RATIONALE:

The aim of this course is to develop an action mindset for sustainable development by imparting knowledge on environmental, social and economic dimensions of sustainability and related principles.

LEARNING OUTCOMES:

After Completion of the course, student will be able to

- Explain current challenges to sustainability, including modern world social, environmental, and economic structures and crises.
- Identify the social environmental, and economic dimensions of sustainability in terms of UN Sustainable development goals
- Explain understanding of the social, economic and ecological linkage of Human well-being, production and consumption
- Discuss sustainability issues and solutions using a holistic approach that focuses on connections between complex human and natural systems.
- Integrate knowledge from multiple sources and perspectives to understand environmental limits governing human societies and economies and social justice dimensions of sustainability.

DETAILED COURSE CONTENT:

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
I	**SUSTAINABILITY AND DEVELOPMENT CHALLEGES** Definition of sustainability – environmental, economical and social dimensions of sustainability – sustainable development models – strong and weak sustainability – defining development- millennium development goals – mindsets for sustainability: earthly, analytical, precautionary, action and collaborative– syndromes of global change: utilisation syndromes, development syndromes, and sink syndromes – core problems and cross cutting Issues of the 21 century – global, regional and local environmental issues – social insecurity – resource degradation –climate change – desertification.	9
II	**PRINCIPLES AND FRAME WORK** History and emergence of the concept of sustainable development – our common future – Stockholm to Rio plus 20– Rio Principles of sustainable development – Agenda 21 natural step- peoples earth charter – business charter for sustainable	9

		development –UN Global Compact – Role of civil society, business and government – United Nations' 2030 Agenda for sustainable development – 17 sustainable development goals and targets, indicators and intervention areas.	
III		**SUSTAINABLE DEVELOPMENT AND WELLBEING** The Unjust World and inequities – Quality of Life – Poverty, Population and Pollution – Combating Poverty – – Demographic dynamics of sustainability – Strategies to end Rural and Urban Poverty and Hunger – Sustainable Livelihood Framework- Health, Education and Empowerment of Women, Children, Youth, Indigenous People, Non-Governmental Organizations, Local Authorities and Industry for Prevention, Precaution , Preservation and Public participation.	9
IV		**SUSTAINABLE SOCIO-ECONOMIC SYSTEMS** Sustainable Development Goals and Linkage to Sustainable Consumption and Production – Investing in Natural Capital- Agriculture, Forests, Fisheries – Food security and nutrition and sustainable agriculture- Water and sanitation – Biodiversity conservation and Ecosystem integrity –Ecotourism – Sustainable Cities – Sustainable Habitats- Green Buildings – Sustainable Transportation — Sustainable Mining – Sustainable Energy– Climate Change –Mitigation and Adaptation – Safeguarding Marine Resources – Financial Resources and Mechanisms	9
V		**ASSESSING PROGRESS AND WAY FORWARD** Nature of sustainable development strategies and current practice- Sustainability in global, regional and national context –Approaches to measuring and analysing sustainability– limitations of GDP Ecological Footprint- Human Development Index- Human Development Report – National initiatives for Sustainable Development – Hurdles to Sustainability – Science and Technology for sustainable development –Performance indicators of sustainability and Assessment mechanism – Inclusive Green Growth and Green Economy – National Sustainable Development Strategy Planning and National Status of Sustainable Development Goals	9
			Total : 45

REFERENCE:

- Tom Theis and Jonathan Tomkin, Sustainability: A Comprehensive Foundation, Rice University, Houston, Texas, 2012
- A guide to SDG interactions: from science to implementation, International Council for Science, Paris,2017
- Karel Mulder, Sustainable Development for Engineers – A Handbook and Resource Guide, Rouledge Taylor and Francis, 2017.
- The New Global Frontier – Urbanization, Poverty and Environment in the 21st Century – George Martine, Gordon McGranahan,Mark Montgomery and Rogelio Fernández-Castilla, IIED and UNFPA, Earthscan, UK, 2008
- Nolberto Munier, Introduction to Sustainability: Road to a Better Future, Springer, 2006
- Barry Dalal Clayton and Stephen Bass, Sustainable Development Strategies- a resource book", Earthscan Publications Ltd, London, 2002.

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TH4D- ROBOTICS

L	T	P		Course Code: OE304D	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45 Hrs.		End Term Exam	: 70
Tutorial		: 0		Progressive Assessment	: 30
Pre Requisite		**: Nil**			
Credit		**: 3**		Category of Course : OE	

RATIONALE:

Robotics boosts skills that are the foundation of success, such as critical-thinking and problem-solving skills. When working on a robot, students are encouraged to use logic, engineering intuition, and critical thinking. Students can come up with problems in their everyday life that they think robots can fix. Allowing students to develop theories that can be tested in robotics projects will strengthen their ability to form hypotheses.

LEARNING OUTCOMES:

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

- Explain basic concepts, parts of robots and types of robots.
- Describe drive systems for robot, sensors and programming of robots.
- Select the robots according to its usage.
- Apply robots with justification and implementation of project.
- Design automation applications of robots in various industries.

DETAILED COURSE CONTENT

Unit	Topic/Sub Topic	Hours
I	**Fundamentals of Robotics:** Introduction; Definition; Robot anatomy (parts) and its working; Robot Components: Manipulator, End effectors; Construction of links, Types of joints; Classification of robots; Cartesian, Cylindrical, Spherical, SCARA, Vertical articulated; Structural Characteristics of robots; Mechanical rigidity; Effects of structure on control work envelope and work Volume; Robot work Volumes, comparison; Advantages and disadvantages of robots.	9
II	**Robotic Drive System and Controller:** Actuators; Hydraulic, Pneumatic and Electrical drives; Linear actuator; Rotary drives; AC servo motor; DC servo motors and Stepper motors; Conversion between linear and rotary motion; Feedback devices; Potentiometers; Optical encoders; DC tachometers; Robot controller; Level of Controller; Open loop and Closed loop controller; Microprocessor based control system; Robot path control: Point to point, Continuous path control and Sensor based path control; Controller programming.	9
III	**Sensors:** Requirements of a sensor; Principles and Applications of the following types of sensors: Position sensors (Encoders, Resolvers, Piezo Electric); Range	9

	sensors (Triangulation Principle, Structured lighting approach); Proximity sensing; Force and torque sensing. Introduction to Machine Vision: Robot vision system (scanning and digitizing image data); Image processing and analysis; Cameras (Acquisition of images); Videocon camera (Working principle & construction); Applications of Robot vision system: Inspection, Identification, Navigation & serving	
IV	**Robot kinematics and Robot Programming:** Forward Kinematics; Inverse Kinematics and Differences; Forward Kinematics and Reverse Kinematics of Manipulators with Two Degrees of Freedom (In 2 Dimensional); Deviations and Problems. Robot programming Languages; VAL Programming; Motion Commands; Sensor Commands; End effecter commands; and Simple programs	9
V	**Automation:** Basic elements of automated system, advanced automation functions, levels of automation. Industrial Applications: Application of robots in machining; welding; assembly and material handling	9

REFERENCES:

- Introduction to Robotics: Analysis, Systems, Applications – Saeed B. Niku
- Industrial Robotics: Technology, Programming and Applications – M.P. Groover
- Robotics Control, Sensing, Vision and Intelligence – Fu.K.S. Gonzalz.R.C and Lee C.S.G,
- Robotics for Engineers – Yoram Koren
- A Text book on Industrial Robotics – Ganesh S. Hedge
- Robotics Technology and Flexible Automation – S.R. Deb & Sankha Deb
- Elements of Robotics Process Automation, Mukherjee

TH5- INDIAN CONSTITUTION

L	T	P
2	0	0

Total Contact Hours	
Theory	: 30 Hrs
Pre Requisite	**: Nil**
Credit	**: 0**

Total Marks: NIL

Course Code: AU 302	
Theory Assessment	
End Term Exam	: 0
Progressive Assessment	: 0
Category of Course	: AU

RATIONALE:

This course makes the students to realise the significance of constitution of India and to know the basic concepts of Indian constitution. Also, they recognize the importance of fundamental rights as well as fundamental duties. In the present-day scenario, this is useful for the engineers in making them available for the country and become responsible citizens.

The basic aim of this subject is to educate the students about constitution of India. As future citizens of India, students will acquire knowledge about individual rights, fostering democracy, the advancement of social welfare through directive principles, maintenance of balanced federal structures, and the upholding the rules and laws for a diverse nation.

LEARNING OUTCOMES:

After completion of the course, the students will be able to**:**

- Explain fundamental principles, features and structures of Indian Constitution.
- Apply constitutional provision to analyse and evaluate real world scenario.
- Demonstrate the impact of constitutional rights and duties on individuals and societies.
- Evaluate the effectiveness of directive principles of state policy in promoting the justice, economies, welfare and inclusive growth.
- Synthesize the core values such as secularism.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**The Constitution - Introduction** • The History of the Making of the Indian Constitution • Preamble and the Basic Structure, and its interpretation • Fundamental Rights and Duties and their interpretation • State Policy Principles	6
II	**Union Government** • Structure of the Indian Union • President – Role and Power • Prime Minister and Council of Ministers • Lok Sabha and Rajya Sabha	6

III	**State Government**	6
	• Governor – Role and Power	
	• Chief Minister and Council of Ministers	
	• State Secretariat	
IV	**Local Administration**	6
	• District Administration	
	• Municipal Corporation	
	• Zila Panchayat	
V	**Election Commission**	6
	• Role and Functioning	
	• Chief Election Commissioner	
	• State Election Commission	

REFERENCES:

1.	Ethics and Politics of the Indian Constitution; Rajeev Bhargava; Oxford University Press, New Delhi, 2008
2.	The Constitution of India; B. L. Fadia; Sahitya Bhawan, New Edition (2017)
3.	Introduction to the Constitution of India; D. D. Basu; Lexis Nexis; Twenty-third 2018 Edition

*Progressive Assessment to be conducted for ensuring learning of students.

PR2- MAJOR PROJECT

L	T	P
0	0	6

Total Contact Hours	
Practical	: 90 Hrs

Pre Requisite	: Nil
Credit	: 3

Total Marks: 200

Course Code: PR302

Project Assessment	
End Term Exam	: 100
Progressive Assessment	: 100
Category of Course	: Project

RATIONALE

The course, Major projects offer a comprehensive learning experience, combining theory with practice, and preparing students for the challenges and opportunities they will encounter in their future careers. It is designed for students to develop skills in problem solving, interdisciplinary learning, research, innovation and preparation for the job market. It also helps the students to gain confidence in tackling problems of their own.

LEARNING OUTCOMES:

After completing this course, student will be able to:

- Demonstrate practical skills in setting up experiments.
- Overcome challenges and obstacles identified in carrying out the project.
- Design effective experimentation using suitable methodology.
- Apply critical thinking skills to interpret results, draw conclusions and make connections to the project's objective.
- Demonstrate skills in communication, technical writing, documentation and presentation.

COURSE CONTENT DETAILS

SUGGESTED ACTIVITIES:

I. Experimentation

- Detailed description of the experimental setup or methodology used.
- Explanation of data collection techniques and instruments employed.
- Record of data, observations, and measurements taken during the project.
- Any modifications or adjustments made to the experimental process during the project.

II. Results and Discussions

- Presentation of the collected data, often through tables, graphs, or figures.
- Analysis and interpretation of the results.
- Comparison of the obtained results with expected outcomes or hypotheses.
- Discussion of any unexpected findings or discrepancies.
- Exploration of the significance of the results in the context of the project objectives and the broader field of engineering.

III. Conclusion

- Summarization of the key findings and results.
- Recapitulation of way to achieve the project objectives.
- Addressing any limitations or constraints encountered during the project.

- Insights into the practical implications of the project's outcomes.

IV. Report Writing

- Structured and organized documentation of the entire project.
- Clear and concise presentation of the project's background, objectives, and
- methodology.
- Inclusion of references and citations for any prior research or literature surveyed.
- Proper formatting and adherence to academic writing conventions.
- Appendices for supplementary information, such as raw data or additional details.

V. Presentation

- Oral presentation of the project's objectives, methods, and results.
- Effective communication of key findings to an audience.
- Use of visual aids (e.g., slides or posters) to support the presentation.
- Addressing questions and engaging in discussions with the audience.
- Demonstrating the significance and practical applications of the project.

ASSESSMENT GUIDELINES

Suggestive criteria for assessing student performance includes:

- Selection of project assignment

- Planning and execution of considerations

- Providing solution of the problems or development of final product

- Quality of performance

- Leadership skills and Sense of responsibility

- Reflective thinking and self-assessment skills

- Teamwork and Interpersonal skills

- Communication and presentation skills

- Report writing skills

Organization of Project Report

1. Cover page:
   It should contain the following (in order)

   i. Title of the Project
   ii. Submitted in partial fulfilment of the requirements for the Diploma in <Branch Name>
   iii. By Name of the Student(s)
   iv. Logo of the Institution
   v. Branch Name/Depart Name and Institution Name with Address
   vi. Academic Year

2. 1st Inner page
   Certificate:
   It should contain he following
   " This is to certify that the work in this Project Report entitled <Project Title> by <Name of the Student (s)> has/have been carried out under my supervision in partial fulfilment of the requirements for the Diploma in <Branch Name> during session <session> in <Branch/Department Name> of <Institute Name> and this work is the

original work of the above student(s)."

Seal and signature of the Supervisor/Guide with date

3. 2nd Inner Page Declaration by the Student(s)
    "I declare that this project entitled <Name of the Project> is my own work, except where indicated through the proper use of citations and references, and has not been submitted in any form for another degree or diploma at any other institute. Information derived from the published and unpublished work of others has been acknowledged in the text and a list of references is given."

    Signature of the Student with date
4. 3rd Inner Page Acknowledgement by the Student(s)
5. Contents.
6. Chapter wise arrangement of Reports
7. Last Chapter: Conclusion
    It should contain
    i.   Conclusion
    ii. Limitations
    iii. Scope for further Improvement
8. References

SEMINAR

	L	T	P			
	0	0	2		**Course Code: SE302**	
Total Contact Hours					**Project Assessment**	
Practical		: 30 Hrs			End Term Exam : 30	
				Total Marks: 100	Progressive Assessment : 70	
Pre Requisite		: Nil				
Credit		: 1			Category of Course : Seminar	

RATIONALE

Technical seminars serve as a vital mechanism for knowledge sharing, skill development, networking, and professional growth within various fields and industries. They provide a structured platform for individuals to engage with their peers, experts, and the latest advancements in their respective domains.

LEARNING OUTCOMES:

After completing this course, student will be able to:

- Collect the necessary information from relevant sources.
- Demonstrate effective communication skills and confidence.
- Develop critical thinking and interdisciplinary awareness.
- Apply current trend and developments in the field of engineering.
- Share the knowledge with the peer group.

COURSE CONTENT DETAILS

Students can be given activities based on the following content areas:

I. Seminar topic identification and Literature review   • Provide an overview of the seminar's theme and its relevance to the field of study.   • Review existing research and literature related to the topic to provide context and background information
II. Current trends, development and case studies   • Discuss the latest trends, innovations, and developments in the field related to the seminar topic.   • Analyze real-world case studies or projects that illustrate the application of the seminar topic.
III. Research methods and ethical consideration   • Introduce research methods and techniques relevant to the topic, including data collection and analysis.   • Explore ethical issues and considerations related to the topic, especially if it has implications for society or the environment.
IV. Presentation, group discussion and Q&A session   • Participants to present their research o findings related to the seminar topic.   • Facilitate group discussions and brainstorming sessions to encourage active engagement and critical thinking.   • Provide opportunities for participants to ask questions and seek clarifications on the seminar content.   • The presentation should include at least 10 slides.   • The presentation should have a minimum duration of 10 minutes
V. Assessment, Evaluation, Conclusion and Summary   • Assessment of the students based on presentation, report and viva voce.   • Recap the key takeaways from the seminar and highlight its significance.