E.G.S. PILLAY ENGINEERING COLLEGE
(Autonomous)
Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai Accredited by NAAC with "A" Grade | Accredited by NBA (CSE, EEE, MECH, CIVIL, ECE, IT)

NAGAPATTINAM – 611 002.

Department of Computer Science & Business Systems

Curriculum and Syllabi

Third Year – Sixth Semester

Code No.	Course Name	L	T	P	C	Hours/Week	CA	ES	Total	Category
	VI SEMESTER									
	Theory Course									
1902BS601	Computer Networks	3	0	0	3	3	40	60	100	PC
1902BS602	Information Security	3	0	2	4	5	50	50	100	PC
1902BS603	Artificial Intelligence	3	0	2	4	5	50	50	100	PC
1902BS604	Financial and Cost Accounting	3	0	0	3	3	50	50	100	PC
	Open Elective I	3	0	0	3	3	40	60	100	OE
1903BS0XX	Professional Elective II	3	0	0	3	3	50	50	100	PE
	Laboratory Course									
1902BS651	Computer Networks Lab	0	0	2	1	2	50	50	100	PC
1901EN601	Business Communication and Value Science – IV	0	0	4	2	4	50	50	100	HSS
1904GE651	Life Skills : Aptitude II	0	0	2	1	2	100	-	100	EEC
	Total	**18**	**0**	**12**	**24**	**30**	**480**	**420**	**900**	

1902BS601		COMPUTER NETWORKS	L	T	P	C
			3	0	0	3

PREREQUISITE:

	NIL

COURSE OBJECTIVES:

	1. To understand the concepts of computer networks and learn techniques for bandwidth utilization.
	2. To study about the various error detection-correction of data and flow control mechanisms.
	3. To Learn the network layer concepts and its protocols.
	4. To introduce the concepts of transport layer concepts and its protocols.
	5. To understand about the application layer concepts and its security.

Module I	INTRODUCTION TO DATA COMMUNICATION NETWORKS	9 Hours

Introduction: Computer networks and distributed systems, Classifications of computer networks, Preliminaries of layered network structures.

Data communication Components: Representation of data and its flow, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media.

LAN: Wired LAN, Wireless LAN, Virtual LANTechniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wavedivision, Concepts on spread spectrum.

Module II	DATA LINK LAYER AND MEDIUM ACCESS SUB LAYER	9 Hours

Fundamentals of Error Detection and Error Correction, Block coding, Hamming Distance, CRC;Flow Control and Error control protocols - Stop and Wait, Go-back–N ARQ, Selective Repeat ARQ,Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, SlottedALOHA, CSMA/CD, CDMA/CA

Module III	NETWORK LAYER	9 Hours

Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Module IV	TRANSPORT LAYER	9 Hours

Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol(TCP), SCTP Congestion Control; Quality of Service (QoS), QoS improving techniques – LeakyBucket and Token Bucket algorithms.

Module V	APPLICATION LAYER AND ITS SECURITY	9 Hours

DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls.Electronic mail, directory services and network management, Basic concepts of Cryptography.

		TOTAL: 45 HOURS

Mode of Assessment:CAT/Assignment/Quiz/Seminar/Presentation/ESE

Course Outcomes:

1. Demonstrate computer network concepts and bandwidth utilization techniques.
2. Analyze the error detection-correction of data and flow control mechanisms.
3. Use of network layer protocols for real time data transmission.
4. Use of transport layer protocols for real time data transmission.
5. Understand the concepts application layer and its security.

FURTHER READING:

REFERENCES:

1. Andrew S. Tanenbaum and David J. Wetherall, "Computer Networks", 5th edition, Pearsoneducation, 2016.

2. William Stallings, "Data and Computer Communication", 10th edition, Pearson education, 2017.

3. Behrouz A .Forouzan, Data communication and Networking, 5thEdition, McGraw-Hill, India, 2014.

4. Davie Bruce S. and Peterson Larry L., "Computer Networks - A System Approach", 5th Edition,Morgan Kaufmann, 2012, Elsevier Inc.

5.	https://nptel.ac.in/courses/106/105/106105183/
6.	https://www.javatpoint.com/computer-network-tutorial
7.	https://www.tutorialspoint.com/data_communication_computer_network/
8.	https://www.geeksforgeeks.org/computer-network-tutorials/

1902BS602	INFORMATION SECURITY	L	T	P	C
		3	0	2	4

PREREQUISITE:

	The course assumes no prior prerequisite is required.

COURSE OBJECTIVES:

	1. To identify the legal, ethical and professional issues in Information Security.
	2. To learn security policies to reflect in system design.
	3. To discuss the awareness in various security standards.
	4. To construct the technological aspects of Information Security.

Module I	SECURITY PARAMETERS AND ACCESS CONTROL MODELS	09 Hours

Confidentiality, integrity and availability; Security violation and threats; Security policy and procedure; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle. **Access Control Models:** Discretionary, mandatory, roll-based and task-based models, access control matrix, temporal and spatio-temporal models.

Module II	SECURITY POLICIES AND SYSTEMS DESIGN	10 Hours

Security Policies: Confidentiality policies, integrity policies, hybrid policies, non-interference and policy composition, international standards. **Systems Design:** Design principles, representing identity, control of access and information flow, confinement problem. Assurance: Building systems with assurance, formal methods, evaluating systems.

Module III	LOGIC-BASED SYSTEM	8 Hours

Logic-based System: Malicious logic, vulnerability analysis, auditing, intrusion detection.

Module IV	REAL - TIME APPLICATIONS	9 Hours

Applications: Network security, operating system security, user security, program security. Special Topics: Data privacy, introduction to digital forensics, enterprise security specification.

Module V	SECURITY FEATURES IN OPERATING SYSTEMS AND IN DATABASE SYSTEMS	9 Hours

Operating Systems Security: Security Architecture, Analysis of Security in Linux/Windows. **Database Security:** Security Architecture, Enterprise security, Database auditing.

	TOTAL: 45 HOURS

LIST OF EXPERIMENTS [SUGGESSTED]

Analysis of security in Unix/Linux.
Administration of users, password policies, privileges and roles

	TOTAL: 30 HOURS

Mode of Assessment: PAT/ESE/Presentation/…

Course Outcomes:
1. Review on security parameters and access control models
2. To understand security policies to design the systems
3. Analyze logic-based systems that challenges security
4. Apply security standards in real - time applications
5. Analyze security features in operating systems and in Database systems

FURTHER READING:

	1. Classical cryptographic methods
	2. Public key crypto systems
	3. Private key crypto systems

REFERENCES:

1. Anderson, R. Security engineering. John Wiley & Sons, 2008.

2. Bishop, M. Computer Security: Art and Science. Pearson Education, Boston, US, 2003.

3. Stamp, M. Information security: principles and practice. John Wiley & Sons, 2014.

4. Pfleeger, C. P., Pfleeger, S. L., and Margulies, J. Security in Computing, ProQuest Safari Tech Books Online, 2017.

5. Zalewski, M. Google browser security handbook, 2009.

6. Gertz, M., &Jajodia, S. (Eds.). Handbook of database security: applications and trends. Springer Science & Business Media, 2007.

7. Wheeler, D. A. Secure programming HOWTO, 2017.

1902BS603	Artificial Intelligence	L	T	P	C
		3	0	2	4

PREREQUISITE:

	Basic Programming in Python
	Data Structures

COURSE OBJECTIVES:

| | Artificial Intelligence is a major step forward in how computer system adapts, evolves and learns. It has widespread application in almost every industry and is considered to be a big technological shift, similar in scale to past events such as the industrial revolution, the computer age, and the smart phone revolution.

This course will give an opportunity to gain expertise in one of the most fascinating and fastest growing areas of Computer Science through classroom program that covers fascinating and compelling topics related to human intelligence and its applications in industry, defence, healthcare, agriculture and many other areas. This course will give the students a rigorous, advanced and professional graduate-level foundation in Artificial Intelligence. |

Module I	Introduction	6 Hours

Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree., Case study: Talkie.ai, ada.cx

Module II	Search Algorithms	12 Hours

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search, Hill climbing search, Search with nondeterminism, Constraint satisfaction problems, Map coloring, Job-shop scheduling, Backtracking for CSPs. Case Study : DeepMind's Alpha Zero, MuZero

Module III	Probabilistic Reasoning	7 Hours

Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

Module IV	Markov Decision process	7 Hours

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs. Case study: How many patients to admit, Reducing wait time at a traffic intersection

Module V	Reinforcement Learning	8 Hours

Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning. Case Study: AWS Deep Racer, DeepMind's AlphaZero, Arcade Learning Environment &Procgen

Module VI	AI Applications & AI Ethics	5 Hours

IBM Watson - Create a retail customer service chatbot, AWS AI Services - Monitor and predict health data using AWS AI services, Automate insurance document processing with AI, The Ethics of AI - Lethal autonomous weapons, Surveillance, security, and privacy, Fairness and bias, Trust and transparency, The future of work, Robot rights, AI Safety

	TOTAL: 45 HOURS

Mode of Assessment: Activity/CAT/ESE

Course Outcomes:
1. Build intelligent agents for search and games
2. Solve AI problems through programming with Python
3. Design Learning optimization and inference algorithms for model learning
4. Design and develop programs for an agent to learn and act in a structured environment
5. Appraise AI Ethics and industrial use cases for realtime problem solving using AI

FURTHER READING:

| | 1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 4th Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill
3. Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi.
4. SarojKaushik, "Artificial Intelligence", Cengage Learning India, 20115
5. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational |

	Agents", Cambridge University Press 2010.

REFERENCES:

https://nptel.ac.in/courses/106105077
https://nptel.ac.in/courses/106106126
https://aima.cs.berkeley.edu
https://ai.berkeley,edu/project_overview.html (for Practicals)
https://developer.ibm.com/tutorials/create-your-first-assistant-powered-chatbot/
https://youtu.be/UDFl_bBGDzQ
https://youtu.be/vRCMzNs0o2s
https://www.youtube.com/@cs188-introductiontoartifi2/videos
Visualizations : http://aimacode.github.io/aima-javascript/

LIST OF EXPERIMENTS [SUGGESSTED]

1. Write a programme to conduct uninformed and informed search.
1.1   Breadth-first search
1.2   Dijkstra's algorithm or uniform-cost search
1.3   Depth-first search and the problem of memory
1.4   Depth-limited and iterative deepening search
1.5   Greedy best-first search
1.6   A* search
2. Write a programme to conduct game search.
2.1   The minimax search algorithm
2.2   Heuristic Alpha--Beta Tree Search
3. Write a programme to conduct Constraint Satisfaction Problems
3.1   Map coloring – Backtracking search
3.2   Job-shop scheduling
4. Write a programme to Infer from the Bayesian network from given data.
5. Write a programme to run value and policy iteration using MDPs
6. Write a programme to do reinforcement learning to implement Q-Learning Agent
7. Mini Project work – Create your first assistant powered chatbot using IBM Watson

	Total Hours:30

Mode of Assessment: Continues Assessment

1902BS604	Financial and Cost Accounting	L	T	P	C
		3	0	0	3

PREREQUISITE:

	Basic Accounting

COURSE OBJECTIVES:

	1. To create an awareness about the importance and usefulness of the accounting concepts and their managerial implications
	2. To develop an understanding of the financial statements and the underlying principles and learn to interpret financial statements
	3. To create an awareness about cost accounting, different types of costing and cost management

Module I	Introduction	2 Hours

Accounting Concept: Introduction, Techniques and Conventions, Financial Statements- Understanding &Interpreting Financial Statements.

Module II	Accounting Process	6 Hours

Book Keeping and Record Maintenance, Fundamental Principles and Double Entry, Journal, Ledger, Trial Balance, Cash Book and Subsidiary Books, Rectification of Errors.

Module III	Financial Statements	12 Hours

Form and Contents of Financial Statements- Trading and Profit and Loss Account, Balance Sheet – Final Accounts-analysing and Interpreting Financial Statements, Accounting Standards.

Module IV	Company Accounts	3 Hours

Audit Reports and Statutory Requirements (in the context of Annual Reports), Directors Report, Notes to Accounts, Pitfalls. Class Discussion: Corporate Accounting Fraud A Case Study of Satyam.

Module V	Cash and Fund Flow	8 Hours

Introduction, How to prepare, Difference between them.

Module VI	Costing Systems	6 Hours

Elements of Cost, Cost Behavior, Cost Allocation, OH Allocation, Unit Costing, Process Costing, Job Costin, Absorption Costing, ABC Analysis.
Class Discussion: Application of costing concepts in the Service Sector.

Module VII	Decision Making using costing	8 Hours

Marginal Costing -Cost Volume Profit Analysis-Budgets.

		TOTAL: 45 HOURS

Mode of Assessment: Activity/CAT/ESE

Course Outcomes:

After completion of the course, student should be able to

1. Enable the budding Technocrat Managers to understand the Financial Accounting Concepts
2. Process the accounting transactions leading to final statement of accounts
3. Analyze the Annual Reports
4. Prepare the FFS and CFS
5. Understand the Costing concepts and make decisions using Marginal costing concepts and budgets

FURTHER READING:

	1.Robert N Anthony, David Hawkins, Kenneth Marchant, Accounting: Texts and Cases, McGraw-Hill
	2. Case Study Materials: To be distributed for class discussion
	3.Advanced Accounting by RL Gupta and Radhaswamy
	4. Advanced Accounting by MC Shukla and Grewal

REFERENCES:

https://www.goodreads.com/book/show/277841
https://www.goodreads.com/book/show/6602359
https://www.amazon.in/Fundamental-Accounting
https://www.amazon.in/Horngrens-Cost-Accounting

1902BS651	COMPUTER NETWORKS LAB	L	T	P	C
		0	0	2	1

PREREQUISITE:

COURSE OBJECTIVES:

	1. To understand the basics of networking commands and network configuration.
	2. To study about the subnet Masking and setting up local area network.
	3. To Learn about the socket programming.
	4. To implement the sliding window protocol.
	5. To simulate the Address Resolution Protocol(ARP).

Course Outcomes:
1. Configure network using commands.
2. Implement subnet masking and setting up local area network.
3. Implement socket programming using TCP and UDP protocols.
4. Simulate sliding window protocol.
5. Implement address resolution protocols.

LIST OF EXPERIMENTS [SUGGESSTED]

1. Study of color coding jack RJ45 and do the following cabling works in a network.
   (a). Cable crimping
   (b). Standard cabling
   (c). Cross cabling

2.Implementation of Stop and Wait Protocol and Sliding Window Protocol.

3. Simulating PING and TRACEROUTE commands.

4.SimulationofARPandRARP.

5. Creating HTTP Socket for Web Page Upload and Download.

6. Implementation of chat using TCP Socket links.

7. Implementation of subnetting and subnet mask.

8. Simulating Domain Name System.

9. File transfer using TCP.

10. Simulate simple network management protocol.

11.Implementation of ECHO and RPC Remote Procedure Call.

12.Case Study of Socket and Client–Server Model.

	Total Hours:30

Mode of Assessment: PAT/ESE/Presentation/…

CourseCode	CourseTitle	L	T	P	C
1901EN601	**BusinessCommunicationandValueScience-IV**	**0**	**0**	**4**	**2**
Pre-requisite	**NIL**		**Syllabusversion**		
			V1		

CourseObjectives:

1. Torecognizethebestpracticesofcommunicativewriting
2. Tounderstandtheimportanceofemotionalintelligenceanddiversityinpersonalandprofessionallives
3. Toacquaintthelearnersoncorporateetiquettes&corporatesocialresponsibility

ExpectedCourseOutcome:

1. Assesstheimpactofconflictsandlistthebasicguidelinesrequiredtomanageconflicts
2. Demonstrateadvancedlevelcommunicationskills
3. Recognizetheimportanceofcorporatesocialresponsibility(CSR)
4. Excel in communicativewriting inreal life scenarios
5. Identify&Relate EmotionalIntelligenceinpersonalandprofessionallife,
   timemanagementpracticesandapplyindiversesituations

Module:1	Listening - Understandingconflicts	12hours

CasestudiesofConflictresolution/Videosonculturaldiversityatworkplace-
advantages andchallenges -CSRstory &CSR activityof TataSteel, Microsoft,Google,TCS, Starbucks,Titan, Tata ChemicalsandTOMSShoes Meaninganddefinitionofconflict-reasonsforconflict-
negativeandpositiveimpactofconflict,Conflictmanagement -Tipsto manageconflict - Conflictmanagement-Listening skills

Module:2	Speaking - BusinessCommunication	12hours

Businessidiomsandcorporateterms-handoutsofcommonbusinessidiomsandguidethemtodownload
theTCSBiz Vocabularyontheirsmart phones -Publicspeakingatworkplaceand bestpracticesofpublicspeaking‒
Presentingaselected-speechbyaneminentleader, Conflictmanagement-Presentation-presentingapitch

Module:3	Reading - CorporateSocialResponsibility(CSR)	12hours

Ubuntustory‒
Astorytointroducetheconceptofsocialresponsibility.AttributesrequiredforworkandlifeQualitiesofagoodteammembe
r:a)Resilience,b)Flexibility,c)Strategicthinking&planningd)
Decision making,e)Resolving conflicts

Module:4	Writing - CommunicativeWriting	12 hours

WhoamI?(ImageManagement,Buildingaperfectimage)/ExploringSelf-awarenessandsocialawarenessthroughNarrativeessay - PrinciplesofCommunicativeWriting,FormalandBusinessletters,business emails/Organizingworkplaceeventsthroughmails Writingstatement of purpose drafting		

Module:5	**CorporateEtiquette& Timemanagement**	**12hours**
ImportanceofEtiquetteinbusinessandeverydaylife,ComponentsofEtiquette–Netiquetteandstandards - Clozetestoncorporateetiquettes-BasicconceptsofTimeManagement-ImportanceofTimeManagementforBetterLifeStyle-Timemanagementactivities:Timesquaredactivity/CircadianRhythmEffectivetimemanagement.		
	TotalLaboratoryhours:	**60hours**

TextBook(s)

1.	Raman,Meenakshi&SangeetaSharma.TechnicalCommunication:PrinciplesandPractice,3rd edition,OxfordUniversityPress,2015.

ReferenceBooks

1.	Carnegie,D.(2017).HowtoDevelopSelf-ConfidenceandInfluencePeoplebyPublicSpeaking (Reissueed.).GalleryBooks
2.	CMuralikrishna&SunithaMishra(2011).CommunicationSkillsforEngineers,2ndedition,NY: Pearson.
3.	Frantisek,Burda(2015).OnTransculturalCommunication,LAPLambertAcademicPublishing,UK.

WebReferences:

1	https://www.tata.com/about-us/tata-group-our-heritage
2	https://economictimes.indiatimes.com/tata-success-story-is-based-on-humanity-philanthropy-and-ethics/articleshow/41766592.cms

OnlineResources:

1	https://youtu.be/reu8rzD6ZAE
2	https://youtu.be/Wx9v_J34Fyo
3	https://youtu.be/F2hc2FLOdhI
4	https://youtu.be/wHGqp8lz36c
5	https://youtu.be/hxS5He3KVEM

ModeofEvaluation:PAT/Assignment/Quiz

LISTOF ELECTIVES

PROFESSIONALELECTIVECOURSES										
						Hours/	MaximumMarks			
Course Code	Course Name	L	T	P	C	Week	CA	ES	Total	Category
PE-2[6thSemester]										
1903BS005	Machine Learning	3	0	0	3	3	40	60	100	PE
1903BS006	Robotics and Embedded Systems	3	0	0	3	3	40	60	100	PE
1903BS007	Engineering Economics	3	0	0	3	3	40	60	100	PE
1903BS008	Industrial Psychology	3	0	0	3	3	40	60	100	PE

1903BS005		MACHINE LEARNING	L	T	P	C
			3	0	0	3

PREREQUISITE:

	NIL

COURSE OBJECTIVES:

	1. To understand the concepts of Machine Learning.
	3. To appreciate the concepts and algorithms of unsupervised learning.
	3. To appreciate supervised learning and their applications.
	4. To understand the theoretical and practical aspects of Probabilistic Graphical Models.
	5. To appreciate the concepts and algorithms of advanced learning.

Module I	Introduction to Machine Learning (ML)	09 Hours

Introduction, Relationship between ML and human learning, A quick survey of major models of how machines learn, Feature engineering, Learning Paradigm, Generalization of hypothesis, VC Dimension, PAC learning, Applications of ML.

Module II	Machine Learning Process and Data Handling	09 Hours

Preliminaries, Testing, Machine Learning algorithms, Turning data into Probabilities and Statistics for Machine Learning, Probability theory, Probability Distributions, Decision Theory, Feature selection Mechanisms, Imbalanced data, Outlier detection.

Module III	Classification	09 Hours

Supervised Learning, The problem of classification, Training and testing classifier models, Cross-validation, Model evaluation (precision, recall, F1-measure, accuracy, area under curve), Statistical decision theory including discriminant functions and decision surfaces, Naive Bayes classification, Bayesian networks, Decision Tree and Random Forests, k-Nearest neighbor classification, Support Vector Machines.

Module IV	Artificial Neural Networks (ANN) and Hidden Markov Models (HMM)	09 Hours

Artificial Neural Networks including backpropagation, Applications of classifications, Ensembles of classifiers including bagging and boosting.HMM with forward-backward and Vierbi algorithms, Sequence classification using HMM, Conditional random fields, Applications of sequence classification such as part-of-speech tagging.

Module V	Regression &Clustering	09 Hours

Multi-variable regression, Model evaluation, Least squares regression, Regularization, LASSO, Applications of regression. Association rule mining algorithms including apriori, Expectation-Maximization (EM) algorithm for unsupervised learning, average linkage, Ward's algorithm, Minimum spanning tree clustering, K-nearest neighbors clustering, BIRCH, CURE, DBSCAN, Anomaly and outlier detection methods.

TOTAL: 45 HOURS

Mode of Assessment: CAT/Assignment/Quiz/Seminar/Presentation/ESE

Course Outcomes:
Upon completion of the course, students shall have ability to
1.Identify applications suitable for different types of Machine Learning.
2. Implement Probabilistic Discriminative and Generative algorithms for an application of your choice and analyze the results.
3. Implement supervised learning and their applications.
4.Design and implement an HMM andNeural Network appropriate to the applications.
5. Use a tool to implement typical Clustering algorithms for different types of applications.

REFERENCES:

1. R.O. Duda, P.E. Hart, D.G. Stork, Pattern Classification, 2/e, Wiley, 2001.

2. C. Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

3. E. Alpaydin, Introduction to Machine Learning, 3/e, Prentice-Hall, 2014.

4. A. Rostamizadeh, A. Talwalkar, M. Mohri, Foundations of Machine Learning, MIT Press.

5. A. Webb, Statistical Pattern Recognition, 3/e, Wiley, 2011.

1903BS006	ROBOTICS AND EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

PREREQUISITE: NIL

COURSE OBJECTIVES:

	1. To acquire Knowledge about microcontrollers embedded processors and their applications.
	2. To understand the internal architecture and interfacing of different peripheral devices with microcontrollers
	3. To understand design concept of embedded systems.
	4. To gain knowledge about the real time operating systems.
	5.To gain knowledge robotics and kinematics

Module I	INTRODUCTION TO EMBEDDED SYSTEM	9 Hours

Embedded system Vs General computing systems, History of Embedded systems, Purpose of Embedded systems, Microprocessor and Microcontroller, Hardware architecture of the real time systems.

Module II	DEVICES AND COMMUNICATION BUSES	9 Hours

I/O Types, serial and parallel communication devices, Wireless communication devices, timer and counting devices, watchdog timer, real time clock, serial bus communication protocols, parallel communication network using ISA,PCI.PCT-X, Internet embedded system network protocols, USB, Bluetooth.

Module III	PROGRAM MODELLING CONCEPTS	9 Hours

Fundamental issues in Hardware software co-design, Unified Modeling Language (UML), Hardware software Trade-offs DFG Model, State Machine Programming Model, Model for Multiprocessor system.

Module IV	REAL TIME OPERATING SYSTEMS & EXAMPLE OF EMBEDDED SYSTEM	9 Hours

Operating system basics, Tasks, Process and Threads, Multiprocessing and Multitasking, task communication, task synchronization, Quality of good RTOS.
Example of Embedded system: Mobile Phones, RFID, WISENET, Robotics, Biomedical Applications, Brain Machine Interface etc., Popular microcontrollers used in embedded systems, Sensors, actuators.

Module V	ROBOTICS AND KINEMATICS	9 Hours

Introduction to robotics, Elements of robots – joints, links, actuators, and sensors, Kinematics of serial robots, Kinematics of parallel robots, Motion planning and control, sensing distance and direction, Line following algorithms, Feedback systems, recent trends and open challenge.

		TOTAL: 45 HOURS

Course Outcomes

1. Understand the key concepts of microcontrollers embedded processors and their applications.
2. Know about internal architecture and interfacing of different peripheral devices with microcontroller.
3. Use of real time operating system for various applications.

Mode of Assessment:CAT/Assignment/Quiz/Seminar/Presentation/ESE

TEXT BOOKS:

1. Shibu K.V " Introduction to Embedded systems" 2nd Edition, McGraw Hill, 2017
2. AshitavaGhosal , " Robotics: Fundamental concepts and Analysis",Oxford University Press 2006
3. MAZADI," The 8051 Micro controller and Embedded systems: Using Assembly and C" Pearson, second edition January 2007.

REFERENCES:

1.L.B. Das , " Embedded system: An Integrated Approach", 1St Edition Pearson Education India,

2.Rajkamal , " Embedded system – Architecture, Programming and Design,"3rd Edition. McGraw Hill Education,2017.

3.FrankVahid and Tony Givargis, " Embedded system Design", A unified Hardware/Software Introduction" Ohn Wiley & Sons 2002.

1903BS007		Engineering Economies	L	T	P	C
			3	0	0	3

PREREQUISITE:

	The course assumes no prior skill or background in design, art or engineering.

COURSE OBJECTIVES:

	1. To enable students to identify and explain economic concepts and theories related to the behaviour of economic agents, markets, industry and firm structures.
	2. To enable students to identify the determinants of various macroeconomic aggregates such as output, unemployment, inflation, productivity and the major challenges associated with the measurement of these aggregates.
	3. To analyse cost/revenue data and carry out economic analyses to justify or reject alternatives/project on an economic basis.

Module I	Introduction to Microeconomics	6 Hours

Demand and Supply- Consumers' Behavior – Indifference Curve Analysis- Applying the Demand and Supply Model- Taxes and Subsidies- Effects of changes in income and price.

Module II	Theory of Production and Cost	6 Hours

Production Function and Iso-quants-Cost Minimization; Cost Curves -Total, Average and Marginal Costs - Long Run and Short Run Costs.

Module III	Market Structure	6 Hours

Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition.

Module IV	Introduction to Macroeconomics	6 Hours

National Income and its Components- GNP, NNP, GDP, NDP; Consumption Function; Investment; Simple Keynesian Model of Income Determination and the Keynesian Multiplier; Government Sector - Taxes and Subsidies; External Sector -Exports and Imports;

Module V	IS-LM Model and Business Cycles	7 Hours

Money - Definitions; Demand for Money -Supply of Money - Bank's Credit Creation Multiplier; IS LM Model; Business Cycles and Stabilization -Monetary and Fiscal Policy - Central Bank and the Government; The Classical Paradigm - Price and Wage Rigidities - Voluntary and Involuntary Unemployment.

Module VI	Engineering Economics and Cost Estimation	6 Hours

Engineering Economics and Decision Making- Cost Concepts- Life Cycle Costing - Cost Estimation Techniques - Parametric and Non-Parametric techniques.

Module VII	Foreign Exchange Rates	6 Hours

Determination – effects- exchange rate regime: fixed, flexible, floating rates– methods of foreign payments – issues in Foreign exchange reserves. International Competitive Bidding- Issues.

Module VIII	Contemporary issues	2 Hours

Guest lectures by Industrial Experts.

		TOTAL: 45 HOURS

Mode of Assessment:CAT/Assignment/Quiz/Seminar/Presentation/ESE

Course Outcomes:

1. Describe the general principles of how the market economy functions
2. Analyse how consumers and producers make decisions and learn about different market structures.
3. Explain the general principles of consumption function and how an economy functions in a global environment.
4. Comprehend the ways in which the government and central bank can influence the economy and the markets through fiscal and monetary policies.
5. Evaluate the methods of cost estimation and to estimate present and future values of cash flows.
6. Evaluate projects using project appraisal techniques

FURTHER READING:

	1. Samuelson, Paul.A and William Nordhaus, "Economics", 2019, 20th Edition, McGraw Hill Publishers, New Delhi.

REFERENCES:

1. Sullivan G William, Elin M Wicks and C. Patrick Koelling, "Engineering Economy", 2018, 17th Edition, Pearson Education.
2. Perloff, Jeffrey M, "Microeconomics", 2019, 7th Edition, Pearson Education.

1903BS008	Industrial Psychology	L	T	P	C
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PREREQUISITE:

	The course assumes no prior skill or background in design, art or engineering.

COURSE OBJECTIVES:

	1. Introduces students to the content areas of industrial psychology and the application of 2. Psychological theory to organizational issues. Acquiring knowledge topics include employment law, job analysis, recruitment and selection, training, performance appraisal and discipline, employee motivation, and workplace safety. 3. Using an applied approach, this course will help prepare students for their roles as employees and managers.

Module I	Introduction	8 Hours

I/O Psychology-definition. Research Methods, Statistics, and Evidence-based Practice, Introduction &
Legal Context of Industrial Psychology, Job Analysis & Competency Modelling, Job Evaluation & Compensation, Job Design & Employee Well-Being, Recruitment.

Module II	Evaluating the Quality of Performance Measures	7 Hours

Identifying Criteria & Validating Tests and Measures, Screening Methods, Intensive Methods.

Module III	Employees Performance and Evaluation	5 Hours

Performance Goals and Feedback, Performance Coaching and Evaluation, Evaluating Employee Performance.

Module IV	Organisational Fairness and Diversity Management	6 Hours

Employee Motivation, Satisfaction and Commitment, Fairness and Diversity.

Module V	Leadership and Organisational Development	6 Hours

Leadership, Organizational Climate, Culture, and Development.

Module VI	OrganisationalBehaviour	6 Hours

Teams in Organizations, The Organization of Work Behaviour

Module VII	Stress Management	5 Hours

Stress Management: Demands of Life and Work

Module VIII	Contemporary issues	2 Hours

Guest lectures by Industrial Experts.

		TOTAL: 45 HOURS

Mode of Assessment:CAT/Assignment/Quiz/Seminar/Presentation/ESE

Course Outcomes:

1. Become conversant about the major content areas of Industrial Psychology (i.e., job analysis, recruitment, selection, employment law, training, performance management, and health/well-being issues in the workplace).
2. Gain further comfort with statistical concepts in the context of making personnel decisions to reinforce content learned in PSY203 or an equivalent introductory statistics course.
3. Gain practical experience by completing a series of hands-on projects involving job analysis, selection decisions, training programs, and employee well-being.
4. Deepen your understanding of tests and measurements so that you can collect accurate information and make sound data-based decisions.
5. Prepare for other focused seminar courses in Industrial/Organizational Psychology or Human Resource Management.

FURTHER READING:

	1. Landy, F. J. and Conte, J. M. Work in the 21st Century,2013, 4th Edition. Oxford: Blackwell Publishing. 2. Aamodt, M. Industrial/Organizational Psychology: An Applied Approach,2015, 8th Edition, Wadsworth Publishing Co.

REFERENCES:

1. Miner.B, J. Industrial-Organizational Psychology. 1992, McGraw Hill Inc., US.
2. Ashwathappa, K. Human Resource Management: Text & Cases,2017,8th Edition, McGraw Hill Education.