DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW



EVALUATION SCHEME & SYLLABUS

FOR

OPEN ELECTIVES I
(VI SEMESTER)

AS PER

AICTE MODEL CURRICULUM
[Effective from the Session: 2024-25]

B.Tech. VI Semester

OPEN ELECTIVE-I

BOE060	**IDEA TO BUSINESS MODEL**
BOE061	**QUALITY CONTROL & RELIABILITY**
BOE062	**EMBEDDED SYSTEM**
BOE063	**INTRODUCTION TO MEMS**
BOE064	**OBJECT ORIENTED PROGRAMMING**
BOE065	**COMPUTER BASED NUMERICAL TECHNIQUES**
BOE066	**GIS & REMOTE SENSING**
BOE067	**BASICS OF DATA BASE MANAGEMENT SYSTEM**
BOE068	**SOFTWARE PROJECT MANAGEMENT**
BOE069	***UNDERSTANDING THE HUMAN BEING COMPREHENSIVELY- HUMAN ASPIRATIONS AND ITS FULFILLMENT**

NOTE:

1. The Student shall choose an open Elective Subject from the list of open elective courses in such a manner that he/she has not studied the same course in any form during the degree programme.
2. The students shall choose an Open Elective course from the prescribed list of open elective courses available at university website for 3rd year (2024-25) in such a mannerthat he/she has not studied the same subject or allied subject in any semester during the entire degree program.
3. Subject to aforesaid condition, the open Elective courses may be offered from the department to all students irrespective of branch. There is no restriction related to branch. The students of any branch (irrespective of department) can select the open elective subjects from the prescribed list of open elective courses.
4. * It is mandatory that for subjects (BOE069) only trained Faculty (who had done the FDP for these courses) will teach the courses.

BOE060 IDEA TO BUSINESS MODEL

Course Objectives:

1. This course can motivate students to have an overall idea how to start and sustain a business enterprise.
2. The students will learn basics of choosing an idea of a business model.
3. The core areas of choosing a business model are encompassed with Entrepreneurship development, PPC & communication system. The students will thus develop basic competencies how to run a business enterprise.

Unit	Topics	Lectures
I	**Introduction** Search for a business idea- How to choose an idea- Product idea- selection of product- The adoption process- Product innovation- Production , planning and development strategy- New product idea.	8
II	Introduction to Entrepreneurship - Meaning and concept of entrepreneurship- Difference between Entrepreneurship & wageemployment - Functions of an Entrepreneur.- Entrepreneur vs Manager- role of entrepreneurship in economic development – Barriers to entrepreneurship.	8
III	The Entrepreneur - types of entrepreneurs- Competencies required to become an entrepreneur - Creative and Design Thinking, the entrepreneurial decision process- The process of Entrepreneurial development prog (EDP)- Evaluation of EDP - Entrepreneur development training.	8
IV	Production system- Design of production system- Types of production system- Production, planning & control (PPC) - Steps of PPC.	8
V	Communication- Importance of communication system - barriers to communication - listening to people- the power of talk - personal selling - risk taking & resilience - negotiation.	8

Text Books:

1. Entrepreneurship Development- Sangeeta Sharma, Kindle edition
2. Production & operations Management- Kanishka Bedi,
3. Marketing Management- Philip Kotler.
4. The Business Model Book: Design, build and adapt business ideas that drive business growth: Adam Bock , Gerard George

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Enhance creative knowledge of students regarding selection of a business idea and it's implementation process.
2. Acquire knowledge on entrepreneurship development, its Pro's and con's.
3. Acquire basic knowledge on how to become an Entrepreneur.
4. Develop knowledge on Production systems and it's sustainability through production, planning and control (PPC)
5. Develop appropriate business model and apply in a better way.

BOE061 Quality Control & Reliability

The students will be able to		KL
CO1	Understand the fundamentals of Quality	K2
CO2	Understand basic statistical concepts, decision preparatory of the control charts and applications.	K2
CO3	Understand the concepts of TQM	K2
CO4	Understand the Reliability and its relationship with Availability and Maintainability	K2
CO5	Understand the Reliability management	K2

Unit	Topics	Lectures
I	**Introduction**: Concept of Quality, Need, Factor influencing quality, Types of Quality, Quality Control, Cost of Quality Control, Quality Assurance, Benefits, Modern concept, Inspection and Quality Control, Quality Characteristics, Quality Circles	8
II	**Statistical Concepts and Control Charts**: Review of fundamental statistical concepts, Frequency distribution, Central tendency, measures of dispersion, Probability distributions, statistical Quality Control, Theory of Control charts, Control charts for variables and attributes (X, R, p, np and C chart), their advantages and disadvantages, Applications	8
III	**Total Quality Management:** Introduction, Concept of Total quality, Quality Function Deployment tools for continuous quality improvement, The ISO 9000 family of standards, Six Sigma and other extensions of TQM	8
IV	**Introduction to Reliability** Concepts and definition of Reliability, Reliability engineering fundamentals; Failure data analysis; Failure rate; mortality curve; Concept of burn in period; Useful life and wear out phase of a system; Mean time to failure (MTTF); Mean time between failure, (MTBF) and mean time to repair (MTTR); Reliability in terms of Hazard rate and failure density, Conditional probability and multiplication rules	
V	**Reliability Management** Reliability testing: Time acceleration factor, influence of acceleration factor in test planning, application to acceleration test, high temperature operating life acceleration model, temperature humidity bias acceleration model, temperature cycle acceleration model, vibration accelerator model, failure free accelerated test planning. Accelerated reliability growth.	8

List of Reference Books:

1. Grant E L, “Statistical Quality Control “, McGraw-Hill.
2. Shrinath L S, “Reliability Engineering” Affiliated East west press.
3. Besterfield D H, “Quality Control”, Prentice Hall.
4. Sharma S C, “Inspection Quality Control and Reliability”, Khanna Publishers.
5. Prabhakar Murthy D N and Marvin R, “Product Reliability”, Springer-Verlag.
6. Dana Crowe and Alec Feinberg, “Design for Reliability”, CRC Press.
7. Reliability Engineering by E. Balagurusamy

BOE062 EMBEDDED SYSTEM

COURSE OBJECTIVE: *After completion of the course student will be able to:*

1. Attain the knowledge of embedded system and its development environment.
2. Gain the knowledge of RTOS based embedded system design and its applications.

COURSE OUTCOME: *After completion of the course student will be able to:*

CO1: Understand the basics of embedded system and its structural units.
CO3: Analyze the embedded system specification and develop software programs.
CO3: Evaluate the requirements of the programming embedded systems, related software architecture.
CO3: Understand the RTOS based embedded system design.
CO3: Understand all the applications of the embedded system and designing issues.

BOE062 EMBEDDED SYSTEM		
Unit	**Topic**	**Lectures**
1	Introduction to Embedded Systems: Introduction to Embedded Systems – The build process for embedded systems- Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.	**8**
2	Embedded Networking: Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols – RS232 standard – RS422 – RS485 – CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) –need for device drivers.	**8**
3	Embedded Firmware Development Environment: Embedded Product Development Life Cycle objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.	**8**
4	RTOS Based Embedded System Design: Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance, comparison of Real time Operating systems: Vx Works, ЧC/OS-II, RT Linux.	**8**
5	Embedded System Application Development: Design issues and techniques Case Study of Washing Machine- Automotive Application- Smart card System Application.	**8**

Text Books:

1. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education , 2007.
3. Steve Heath, "Embedded System Design", Elsevier, 2005.
4. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051
5. Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007.

BOE063 INTRODUCTION TO MEMS

COURSE OBJECTIVE: *After completion of the course student will be able to:*

1. Understand the Basic concept of MEMS, Mechanics of Beam and Diaphragm Structures, Air Damping and Electrostatic Actuation.
2. Know the knowledge of Thermal Effects and the Applications of MEMS in RF.

COURSE OUTCOME: *After completion of the course student will be able to:*

CO1: Understand the Basic concept of MEMS Fabrication Technologies, Piezoresistance Effect, Piezoelectricity, Piezoresistive Sensor.
CO2: Explain Mechanics of Beam and Diaphragm Structures.
CO3: Understand the Basic concept of Air Damping and Basic Equations for Slide-film Air Damping, Couette-flow Model, Stokes-flow Model.
CO4: Know the concept of Electrostatic Actuation.
CO5: Understand the applications of MEMS in RF

BOE-063 INTRODUCTION TO MEMS		
Unit	**Topic**	**Lectures**
1	**Introduction to MEMS:** MEMS Fabrication Technologies, Materials and Substrates for MEMS, Processes for Micromachining, Characteristics, Sensors/Transducers, Piezoresistance Effect, Piezoelectricity, Piezoresistive Sensor.	**8**
2	**Mechanics of Beam and Diaphragm Structures:** Stress and Strain, Hooke's Law. Stress and Strain of Beam Structures: Stress, Strain in a Bent Beam, Bending Moment and the Moment of Inertia, Displacement of Beam Structures Under Weight, Bending of Cantilever Beam Under Weight.	**8**
3	**Air Damping:** Drag Effect of a Fluid: Viscosity of a Fluid, Viscous Flow of a Fluid, Drag Force Damping, The Effects of Air Damping on Micro-Dynamics. Squeeze-film Air Damping: Reynolds' Equations for Squeeze-film Air Damping, Damping of Perforated Thick Plates. Slide-film Air Damping: Basic Equations for Slide-film Air Damping, Couette-flow Model, Stokes-flow Model.	**8**
4	**Electrostatic Actuation:** Electrostatic Forces, Normal Force, Tangential Force, Fringe Effects, Electrostatic Driving of Mechanical Actuators: Parallel-plate Actuator, Capacitive sensors. Step and Alternative Voltage Driving: Step Voltage Driving, Negative Spring Effect and Vibration Frequency.	**8**
5	**Thermal Effects:** Temperature coefficient of resistance, Thermo-electricity, Thermocouples, Thermal and temperature sensors. **Applications of MEMS in RF** MEMS Resonator Design Considerations, One-Port Micromechanical Resonator Modeling Vertical Displacement Two-Port Microresonator Modeling, Micromechanical Resonator Limitations.	**8**

Text & Reference Books:

1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalakrishnan, K. N. Bhat and V. K. Atre, "Micro and smart systems", Wiley India, 2010.
2. S.M. Sze, "Semiconductor Sensors", John Wiley & Sons Inc., Wiley Interscience Pub.
3. M.J. Usher, "Sensors and Transducers", McMillian Hampshire.
4. RS Muller, Howe, Senturia and Smith, "Micro sensors", IEEE Press.

BOE-064 OBJECT ORIENTED PROGRAMMING

COURSE OBJECTIVE: After completion of the course student will be able to:

1. Understand the Basic concept of Object Orientation, object identity and Encapsulation.
2. Know the knowledge of Basic Structural Modeling, Object Oriented Analysis and C++ Basics.

COURSE OUTCOME: After completion of the course student will be able to:

CO1: Understand the Basic concept of Object Orientation, object identity and Encapsulation.
CO2: Understand the Basic concept of Basic Structural Modeling.
CO3: Know the knowledge of Object oriented design, Object design.
CO4: Know the knowledge of C++ Basics.
CO5: Understand the Basics of object and class in C++.

BOE-064 OBJECT ORIENTED PROGRAMMING		
Unit	**Topic**	**Lectures**
1	Introduction: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modelling, principles of modelling, object oriented modelling, Introduction to UML, conceptual model of the UML, Architecture.	**8**
2	Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Class &Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams. Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration Diagrams, iterated messages, use of self in messages. Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, call-back mechanism, broadcast messages. Basic Behavioural Modeling: Use cases, Use case Diagrams, Activity Diagrams, State Machine , Process and thread, Event and signals, Time diagram, interaction diagram, Package diagram. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams	**8**
3	Object Oriented Analysis: Object oriented design, Object design, Combining three models, Designing algorithms, design optimization, Implementation of control, Adjustment of inheritance, Object representation, Physical packaging, Documenting design considerations. Structured analysis and structured design (SA/SD), Jackson Structured Development (JSD).Mapping object oriented concepts using non-object oriented language, Translating classes into data structures, Passing arguments to methods, Implementing inheritance, associations encapsulation. Object oriented programming style: reusability, extensibility, robustness, programming in the large. Procedural v/s OOP, Object oriented language features. Abstraction and Encapsulation.	**8**
4	C++ Basics : Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures C++ Functions : Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions	**8**
5	Objects and Classes : Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion. Inheritance : Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class Polymorphism : Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism	**8**

Text Books:

1. James Rumbaugh et. al, “Object Oriented Modeling and Design”, PHI
2. Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Pearson Education
3. Object Oriented Programming with C++, E Balagurusamy, TMH

Reference Books:

1. R. S. Salaria, Mastering Object Oriented Programming with C++, Khanna Publishing House
2. C++ Programming, Black Book, Steven Holzner, dreamtech
3. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia
4. Object Oriented Programming with ANSI and Turbo C++, Ashok Kamthane, Pearson
5. The Compete Reference C++, Herbert Schlitz, TMH
6. C++ and Object Oriented Programming Paradigm, PHI
7. C++ : How to Program, 9th Edition, Deitel and Deitel, PHI

BOE 065: COMPUTER BASED NUMERICAL TECHNIQUES

Course Objectives:

The objective of this course is to familiarize the graduate engineers with techniques in errors, approximations, approximates roots, Interpolation, finite differences, numerical differentiation and integration programming, numerical solution of differential equations and boundary value problems. It aims to equip the students with standard concepts and tools from previously gained knowledge to an advanced level that will enable them to tackle more advanced level of Optimization techniques and applications that they would find useful in their disciplines.

The students will learn:

- To apply the knowledge of errors, roots and application in the field of engineering.
- To deal deals with finite differences and interpolation to solve engineering problems involving complicated real life situations etc.
- To deal with numerical integration and differentiation that is required in different branches of Engineering to graduate engineers for applying more difficult problems in case of complex structures.
- To deals with numerical solution of differential Equations for engineering problems involving real life situations etc.
- To deal with boundary value problems of real life systems and Engineers.

BOE 065 COMPUTER BASED NUMERICAL TECHNIQUES		
Unit	**Topic**	**Lectures**
1	**Error and roots of Algrabraic and Transcendental Equations:** Introduction of Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation. Solution of Algebraic and Transcendental Equation**:** Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding real and complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations.	**8**
2	**Interpolation:** Introduction Finite Differences, Difference tables Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula. Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation.	**8**
3	**Numerical Integration and Differentiation**: Introduction: Numerical differentiation of Newton's forward and backward formula, Stirling's, Bessel's, Everett's formula, Lagrange's Interpolation and Newton Divided difference formula. **Numerical Integration**: Newton cotes formula, Trapezoidal rule, Simpson's 1/3 and 3/8 rules, Boole's rule, Waddle's rule.	**8**
4	**Solution of differential Equations:** Introduction, Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta Methods, Predictor Corrector Methods, Automatic Error Monitoring and Stability of solution.	**8**
5	**Boundary Value problems:** Introduction, Finite difference method, solving Eigen value problems, polynomial method and power methods. Numerical solution of Partial Differential equations. Elliptic, Parabolic and hyperbolic PDEs. Distillation in a Plate Column, Unsteady-state Operation, Starting a Stirred-tank Reactor, Rate at which a Plate Absorber Approaches Steady State.	**8**

Note: PS: Practice session: Students should practice the Flow Charts and algorithm of some important programs

Text Books:

1. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age International.
2. Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi**.**

Reference Books

1. Rajaraman V, Computer Oriented Numerical Methods, Pearson Education
2. T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, McGraw Hill
3. Pradip Niyogi, Numerical Analysis and Algorithms, McGraw Hill.
4. Francis Scheld, Numerical Analysis, McGraw Hill.
5. Sastry S. S, Introductory Methods of Numerical Analysis, Pearson Education.
6. Kiusalaas, J.: Numerical methods in engineering with MATLAB, Cambridge University Press
7. Woodford, C and Phillips, C: Numerical methods with worked examples: MATLAB Edition, Springer

COURSE OUTCOMES: At the end of this course, the students will be able to:

	Course Outcome (CO)	**Bloom's Knowledge Level (KL)**
CO 1	Understand the concept of errors to evaluate approximate roots of several types of equations	K_2& K_5
CO 2	Analyze the problem and evaluate data by different interpolation methods and creating interpolating graphs	K_4, K_5&K_6
CO 3	Understand the concept of interpolation to analyze and evaluate the numerical differentiation and integration	K_2 & K_5
CO 4	Remember the concept of formula based the solution of ordinary differential equations to evaluate differential equations withy initial conditions	K_1&K_5
CO 5	Apply the concept of partial differential equation to evaluate the partial differential equations	K_3& K_5

K_1 – Remember, K_2 – Understand, K_3 – Apply, K_4 – Analyze, K_5 – Evaluate, K_6 – Create

BOE066 GIS & REMOTE SENSING

COURSE OBJECTIVE: *Students undergoing this course are expected to-*

1. Understand about the principles of GIS, Remote Sensing, Spatial Systems, and its applications to Engineering Problems.

COURSE OUTCOME: *After completion of the course student will be able to-*

CO1: Understand about the principles of Remote Sensing and its advantages and limitations.
CO2: Retrieve the information content of remotely sensed data.
CO3: Apply problem specific remote sensing data for engineering applications.
CO4: Analyze spatial and attribute data for solving spatial problems.
CO5: Create GIS and cartographic outputs for presentation

BOE066 GIS & REMOTE SENSING		
Unit	**Topic**	**Lectures**
1	Basic component of remote sensing (RS), advantages and limitations of RS, possible use of RS techniques in assessment and monitoring of land and water resources; electromagnetic spectrum, energy interactions in the atmosphere and with the Earth's surface; major atmospheric windows; principal applications of different wavelength regions; typical spectral reflectance curve for vegetation, soil and water, spectral signatures.	**8**
2	Different types of sensors and platforms; contrast ratio and possible causes of low contrast; aerial photography; types of aerial photographs, scale of aerial photographs, planning aerial photography- end lap and side lap; stereoscopic vision, requirements of stereoscopic photographs; air-photo interpretation- interpretation elements;	**8**
3	Photogrammetry- measurements on a single vertical aerial photograph, measurements on a stereo-pair- vertical measurements by the parallax method; ground control for aerial photography; satellite remote sensing, multispectral scanner- whiskbroom and push-broom scanner; different types of resolutions; analysis of digital data- image restoration; image enhancement; information extraction, image classification, unsupervised classification, supervised classification, important consideration in the identification of training areas, vegetation indices.	**8**
4	Microwave remote sensing. GI Sand basic components, different sources of spatial data, basic spatial entities, major components of spatial data, Basic classes of map projections and their properties. .	**8**
5	Methods of data input into GIS, Data editing, spatial data models and structures, Attribute data management, integrating data (map overlay) in GIS, Application of remote sensing and GIS for the management of land and water resources.	**8**

Text & Reference Books:

1. Reddy Anji, M. 2006. Textbook of Remote Sensing and Geographical Information Systems. BS Publications, Hyderabad.
2. Elangovan, K. 2006. GIS Fundamentals Applications and Implementations. New India Publication Agency, New Delhi.
3. George Joseph. 2005. Fundamentals of Remote Sensing. 2nd Edition. Universities Press (India) Private Limited, Hyderabad.
4. Jensen, J.R. 2013. Remote Sensing of the Environment: An Earth Resource Perspective. Pearson Education Limited, UK.
5. Lillesand, T., R.W. Kiefer and J. Chipman. 2015. Remote Sensing and Image Interpretation. 7th Edition, John Wiley and Sons Singapore Pvt. Ltd., Singapore.
6. Sabins, F.F. 2007. Remote Sensing: Principles and Interpretation. Third Edition, Waveland Press Inc., Illinois, USA.

BOE-067 BASICS OF DATA BASE MANAGEMENT SYSTEM

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to:		
CO 1	Describe the features of a database system and its application and compare various types of data models.	K_2
CO 2	Construct an ER Model for a given problem and transform it into a relation database schema.	K_5, K_6
CO 3	Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus.	K_5, K_6
CO 4	Explain the need of normalization and normalize a given relation to the desired normal form.	K_2, K_3
CO 5	Explain different approaches of transaction processing and concurrency control.	K_2

DETAILED SYLLABUS		3-0-0
Unit		**Lecture**
I	**Introduction:** An overview of database management system, database system vs file system, database system concepts and architecture, views of data – levels of abstraction, data models, schema and instances, data independence, database languages and interfaces, data definition languages, DML, overall database structure, transaction management, storage management, database users and administrator. **Data Modeling using the Entity Relationship Model:** ER model concepts, notation for ER diagram, mapping constraints, keys, concepts of super key, candidate key, primary key, generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.	**08**
II	**Relational Database Concepts:** Introduction to relational database, relational database structure, relational model terminology – domains, attributes, tuples, relations & relational database schema, integrity constraints, entity integrity, referential integrity, keys constraints, domain constraints, Relational algebra - relational calculus, tuple and domain calculus, basic operations – selection and projection, set-theoretic operations, join operations. **Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, & third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design	**08**
III	**Structured Query Language (SQL):** Basics of SQL, DDL, DML, DCL, advantage of SQL, SQL data type and literals, types of SQL commands, SQL operators and their procedure, tables – creation & alteration, defining constraints, views and indexes, queries and sub queries, aggregate functions, built-in functions, insert, update and delete operations, joins, unions, intersection, minus, transaction control commands. **PL/SQL:** Introduction, features, syntax and constructs, SQL within Pl/SL, DML in PL/SQLCursors, stored procedures, stored function, database triggers, indices	**08**
IV	**Transaction Processing Concepts:** Transaction concepts, properties of transaction, testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, recovery from transaction failures, two-phase commit protocol, log based recovery, checkpoints, deadlock handling. **Concurrency Control Techniques:** Concurrency control, locking techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity, multi-version schemes, recovery with concurrent transaction.	**08**

V	**Database Security** – Types of security, system failure, backup & recovery techniques, authorization & authentication, system policies, levels of security – physical, OS, network & DBMS, privileges – grant & revoke. **Recent Trends in Database Management Systems:** Centralized and Client-Server Architectures, Distributed Databases, Object-Oriented Database, Spatial & Temporal Databases, Decision Support Systems, Data Analysis, Data Mining & Warehousing, Data Visualization, Mobile Databases, OODB & XML Databases, Multimedia & Web Databases, Spatial and Geographical Databases, Web and Mobile Databases, Active Databases	**08**

Text books:

1. Elmasri, Navathe, "Fundamentals of Database System", Addision Wesley.
2. Korth, Silbertz, Sudarshan, "Database Concepts", Mc Graw Hill.
3. Bipin C. Desai, "An Introduction to Database System", Galgotia Publication.
4. Majumdar & Bhattacharya, "Database Management System", McGraw Hill.
5. Date C.J., "An Introduction to Database System", Addision Wesley.
6. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill.
7. Atul Kahate, "Introduction to Database Management Systems", Pearson Education.
8. Paul Beynon Davies, "Database System", Palgrave Macmillan.
9. Bharti P.K., " An Introduction to Database Systems", JPNP.
10. Rajesh Narang, "Database Management System", PHI.
11. Singh, S.K., "Database System Concepts – design & application", Pearson Education.
12. Leon & Leon, "Database Management Systems", Vikas Publishing House.
13. O'Neil, "Databases", Elsevier Pub.
14. Ivan Bayross, "SQL, PL/SQL – The Programming Language of Oracle", BPB Publications.
15. P.S. Deshpande, "SQL and PL/SQL for Oracle 10g, Black Book", Dreamtech Press.
16. George Koch, Kevin Loney, "Oracle: The Complete Reference", McGraw Hill.
17. Coronel, Morris and Rob, "Database Principles: Fundamentals of Design, Implementation and Management", Cengage Learning.
18. Gillenson, Paulraj Ponniah, "Introduction to Database Management", Wiley.
19. G. K. Gupta, "Database Management Systems", McGraw Hill.
20. Shraman Shah, "Oracle for Professional", SPD.

BOE-068 SOFTWARE PROJECT MANAGEMENT		
Course Outcome (CO)		**Bloom's Knowledge Level (KL)**
At the end of course , the student will be able :		
CO 1	Identify project planning objectives, along with various cost/effort estimation models.	K_3
CO 2	Organize & schedule project activities to compute critical path for risk analysis.	K_3
CO 3	Monitor and control project activities.	K_4, K_5
CO 4	Formulate testing objectives and test plan to ensure good software quality under SEI-CMM.	K_6
CO 5	Configure changes and manage risks using project management tools.	K_2, K_4

DETAILED SYLLABUS		3-0-0
Unit		**Lecture**
I	**Project Evaluation and Project Planning :** Importance of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.	**08**
II	**Project Life Cycle and Effort Estimation :** Software process and Process Models – Choice of Process models – Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II – a Parametric Productivity Model.	**08**
III	**Activity Planning and Risk Management :** Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning – Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.	**08**
IV	**Project Management and Control:** Framework for Management and control Collection of data Visualizing progress – Cost monitoring Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control Software Configuration Management – Managing contracts – Contract Management.	**08**
V	**Staffing in Software Projects :** Managing people – Organizational behavior – Best methods of staff selection Motivation – The Oldham Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams Decision making Organizational structures Dispersed and Virtual teams – Communications genres Communication plans Leadership.	**08**

Text books:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, McGraw Hill, New Delhi, 2012.
2. Robert K. Wysocki ―Effective Software Project Management – Wiley Publication, 2011.
3. Walker Royce: ―Software Project Management- Addison-Wesley, 1998.
4. Gopalaswamy Ramesh, ―Managing Global Software Projects – McGraw Hill Education (India), Fourteenth Reprint 2013.

BOE-069 UNDERSTANDING THE HUMAN BEING COMPREHENSIVELY – HUMAN ASPIRATIONS AND ITS FULFILLMENT

Course Objectives:

1. To help the students having the clarity about human aspirations, goal, activities and purpose of life.
2. To facilitate the competence to understand the harmony in nature/existence and participation of human being in the nature/existence.
3. To help the students to develop the understanding of human tradition and its various components.

Course Methodology:

1. The methodology of this course is exploration and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. It is free from any dogma or set of do's and don'ts related to values.
3. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated and encouraged to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation.
4. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student leading to continuous self-evolution.
5. This self-exploration also enables them to critically evaluate their preconditioning and present beliefs.

BOE-069 UNDERSTANDING THE HUMAN BEING COMPREHENSIVELY- HUMAN ASPIRATIONS AND ITS FULFILLMENT		
Unit	**Topic**	**Lectures**
1	**Introduction:** The basic human aspirations and their fulfillment through Right understanding and Resolution; All-encompassing Resolution for a Human Being, its details and solution of problems in the light of Resolution.	**8**
2	**Understanding Human being and its expansion:** The domain of right understanding starts from understanding the human being (the knower, the experience and the doer); and extends up to understanding nature/existence – its interconnectedness and co-existence; and finally understanding the role of human being in existence (human conduct).	**8**
3	**Activities of the Self:** Understanding the human being comprehensively is the first step and the core theme of this course; human being as co-existence of the self and the body; the activities and potentialitiesof the self; Reasons for harmony/contradiction in the self.	**8**
4	**Understanding Co-existence with other orders:** The need and the process of inner evolution (through self-exploration, selfawareness and self-evaluation)- particularly awakening to activities of the Self: Realization, Understanding and Contemplation in the Self (Realization of Co-Existence, Understanding of Harmony in Nature and Contemplation of Participation of Human in this harmony/ order leading to comprehensive knowledge about the existence).	**8**
5	**Expansion of harmony from self to entire existence:** Understanding different aspects of All-encompassing Resolution (understanding, wisdom, science etc.), Holistic way of living for Human Being with All-encompassing Resolution covering all four dimensions of human endeavour viz., realization, thought, behavior and work (participation in the larger order) leading to harmony at all levels from self to Nature and entire Existence.	**8**

Reference Books:

1. A Foundation Course in Human Values and Profession Ethics (Text Book and Teachers' Manual), R. R. Gaur, R. Sangal, G. P. Bagaria (2010), Excel Books, New Delhi [ISBN 978-8- 174-46781-2]
2. Avartansheel Arthshastra, A. Nagraj, Divya Path Sansthan, Amarkantak, India
3. Economy of Permanence – (a quest for social order based on non-violence), J. C. Kumarappa (2010), Sarva-Seva-Sangh-Prakashan, Varansi, India
4. Energy and Equity, Ivan Illich (1974), The Trinity Press, Worcester & Harper Collins, USA
5. Ishandi Nau Upnishad, Shankaracharya, Geeta press, Gorakhpur,
6. Manav Vyavahar Darshan, A. Nagraj, Divya Path Sansthan, Amarkantak, India
7. Manaviya Sanvidhan, A. Nagraj, Divya Path Sansthan, Amarkantak, India