ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
III SEMESTER CURRICULUM & SYLLABI

SEMESTER III

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
2.	EC8351	Electron Devices and Circuits	ES	3	3	0	0	3
3.	EE8351	Digital Logic Circuits	PC	4	2	2	0	3
4.	EI8351	Electrical Measurements	PC	4	2	2	0	3
5.	EI8352	Transducers Engineering	PC	3	3	0	0	3
6.	CS8392	Object Oriented Programming	ES	3	3	0	0	3
PRACTICALS								
7.	EI8361	Measurements and Transducers Laboratory	PC	4	0	0	4	2
8.	CS8382	Object Oriented Programming Laboratory	ES	4	0	0	4	2
			TOTAL	**29**	**17**	**4**	**8**	**23**

MA8353 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

L	T	P	C
4	0	0	4

OBJECTIVES :

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV FOURIER TRANSFORMS 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL : 60 PERIODS

OUTCOMES :

Upon successful completion of the course, students should be able to:

- Understand how to solve the given standard partial differential equations.
- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
- Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

- Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

TEXT BOOKS :

1. Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.
2. Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCES :

1. Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.
2. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.
3. Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.
4. James, G., "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

EC8351 ELECTRON DEVICES AND CIRCUITS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the structure of basic electronic devices.
- Be exposed to active and passive circuit elements.
- Familiarize the operation and applications of transistor like BJT and FET.
- Explore the characteristics of amplifier gain and frequency response.
- Learn the required functionality of positive and negative feedback systems.

UNIT I PN JUNCTION DEVICES 9

PN junction diode –structure, operation and V-I characteristics, diffusion and transition capacitance - Rectifiers – Half Wave and Full Wave Rectifier,– Display devices- LED, Laser diodes, Zener diodecharacteristics- Zener Reverse characteristics – Zener as regulator

UNIT II TRANSISTORS AND THYRISTORS 9

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristors and IGBT - Structure and characteristics.

UNIT III AMPLIFIERS 9

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response – MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response- High frequency analysis.

UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER 9

BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).

UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS 9

Advantages of negative feedback – voltage / current, series , Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Explain the structure and working operation of basic electronic devices.
- Able to identify and differentiate both active and passive elements
- Analyze the characteristics of different electronic devices such as diodes and transistors
- Choose and adapt the required components to construct an amplifier circuit.
- Employ the acquired knowledge in design and analysis of oscillators

TEXT BOOKS:

1. . David A. Bell ,"Electronic devices and circuits", Oxford University higher education, 5th edition 2008.
2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University Press

REFERENCES:

1. Balbir Kumar, Shail.B.Jain, "Electronic devices and circuits" PHI learning private limited, 2nd edition 2014.
2. Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.
3. Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2003.
4. Robert L.Boylestad, "Electronic devices and circuit theory", 2002.
5. Robert B. Northrop, "Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation", CRC Press, 2004.

EE8351	DIGITAL LOGIC CIRCUITS	L	T	P	C
		2	2	0	3

OBJECTIVES:

- To study various number systems and simplify the logical expressions using Boolean functions
- To study combinational circuits
- To design various synchronous and asynchronous circuits.
- To introduce asynchronous sequential circuits and PLDs
- To introduce digital simulation for development of application oriented logic circuits.

UNIT I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES 6+6

Review of number systems, binary codes, error detection and correction codes (Parity and Hamming code) - Digital Logic Families -comparison of RTL, DTL, TTL, ECL and MOS

families -operation, characteristics of digital logic family.

UNIT II COMBINATIONAL CIRCUITS 6+6

Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, subtractors, Encoders and Decoders.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 6+6

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Melay models- Counters, state diagram; state reduction; state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABILITY LOGIC DEVICES 6+6

Asynchronous sequential logic circuits-Transition tability, flow tability-race conditions, hazards &errors in digital circuits; analysis of asynchronous sequential logic circuits-introduction to Programmability Logic Devices: PROM – PLA –PAL, CPLD-FPGA.

UNIT V VHDL 6+6

RTL Design – combinational logic – Sequential circuit – Operators – Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, flip flops, Multiplexers & De multiplexers).

TOTAL : 60 PERIODS

OUTCOMES:

- Ability to design combinational and sequential Circuits.
- Ability to simulate using software package.
- Ability to study various number systems and simplify the logical expressions using Boolean functions
- Ability to design various synchronous and asynchronous circuits.
- Ability to introduce asynchronous sequential circuits and PLDs
- Ability to introduce digital simulation for development of application oriented logic circuits.

TEXT BOOKS:

1. James W. Bignel, Digital Electronics, Cengage learning, 5th Edition, 2007.
2. M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education, 2013.
3. Comer "Digital Logic & State Machine Design, Oxford, 2012.

REFERENCES

1. Mandal, "Digital Electronics Principles & Application, McGraw Hill Edu, 2013.
2. William Keitz, Digital Electronics-A Practical Approach with VHDL, Pearson, 2013.
3. Thomas L.Floyd, 'Digital Fundamentals', 11th edition, Pearson Education, 2015.
4. Charles H.Roth, Jr, Lizy Lizy Kurian John, 'Digital System Design using VHDL, Cengage, 2013.
5. D.P.Kothari,J.S.Dhillon, 'Digital circuits and Design',Pearson Education, 2016.

EI8351 ELECTRICAL MEASUREMENTS L T P C
2 2 0 3

OBJECTIVES:

- To introduce the meters used to measure current & voltage.
- To have an adequate knowledge in the measurement techniques for power and energy, power and energy meters are included.
- To provide Elaborate discussion about potentiometer & instrument transformers.
- To provide Detailed study of resistance measuring methods.
- To provide Detailed study of inductance and capacitance measurement.

UNIT I MEASUREMENT OF VOLTAGE AND CURRENT 6+6

Galvanometers: – Ballistic, D'Arsonval galvanometer – Theory, calibration, application – Principle, construction, operation and comparison of moving coil, moving iron meters, dynamometer, induction type & thermal type meter, rectifier type – Extension of range and calibration of voltmeter and ammeter – Errors and compensation.

UNIT II MEASUREMENT OF POWER AND ENERGY 6+6

Electrodynamometer type wattmeter: – Theory & its errors – Methods of correction – LPF wattmeter– Phantom loading – Induction type kWh meter – Induction type energy meter – Calibration of wattmeter and Energy meter.

UNIT III POTENTIOMETERS & INSTRUMENT TRANSFORMERS 6+6

DC potentiometer:– Basic circuit, standardization – Laboratory type (Crompton's) – AC potentiometer:-Drysdale (polar type) type – Gall-Tinsley (coordinate) type – Limitations & applications – Instrument Transformer:-C.T and P.T construction, theory, operation and characteristics.

UNIT IV RESISTANCE MEASUREMENT 6+6

Measurement of low, medium & high resistance: – Ammeter, voltmeter method – Wheatstone bridge– Kelvin double bridge – Series and shunt type ohmmeter – High resistance measurement :-Loss of charge method, Megohm bridge method –Megger – Direct deflection methods – Price's guard-wiremethod – Earth resistance measurement.

UNIT V IMPEDANCE MEASUREMENT 6+6

A.C bridges:– Measurement of inductance, capacitance – Q of coil – Maxwell Bridge – Wein's bridge– Schering bridge – Anderson bridge –Hay's bridge- Campbell bridge to measure mutual inductance – Errors in A.C. bridge methods and their compensation – Detectors – Excited field – A.C. galvanometer– Vibration galvanometer.

TOTAL:60 PERIODS

COURSE OUTCOMES

At the end of the course, the student should have the:

1. Ability to measure current and voltage,
2. Ability to understand AC and DC measurements.
3. Ability to measure power and calibration of energy meters.
4. Ability to measure current and voltage using potentiometric method.
5. Ability to understand the resistance measurement
6. Ability to use bridge circuit to measure resistance, inductance and capacitance.

TEXT BOOKS

1. E.W. Golding &F.C.Widdis, 'Electrical Measurements & Measuring Instruments', A.H.Wheeler& Co, 2001
2. H.S. Kalsi, Electronic Instrumentation, McGraw-Hill Education, New Delhi, 2010

REFERENCES

1. A.K. Sawhney, A Course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Rai and Co, New Delhi, 2010.
2. S.K.Singh, 'Industrial Instrumentation and control', Tata McGraw Hill, 2nd edn., 2002.
3. J.B.Gupta, 'A Course in Electronic and Electrical Measurements and Instrumentation', S.K.Kataria& Sons, Delhi, 2003.
4. Martin U. Reissland, 'Electrical Measurement – Fundamental Concepts and Applications', New Age International (P) Ltd., 2001.
5. R.B. Northrop, Introduction to Instrumentation and Measurements, Taylor & Francis, New Delhi, 2008.
6. M.M.S. Anand, "Electronics Instruments and Instrumentation Technology", Prentice Hall India, NewDelhi, 2009.
7. J.J. Carr, "Elements of Electronic Instrumentation and Measurement", Pearson Education India, New Delhi, 2011.

EI8352 TRANSDUCERS ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES

- Get to know the methods of measurement, classification of transducers and to analyze error.
- To understand the behavior of transducers under static and dynamic conditions and hence to model the transducer.
- Get exposed to different types of resistive transducers and their application areas.
- To acquire knowledge on capacitive and inductive transducers.
- To gain knowledge on variety of transducers and get introduced to MEMS and Smart transducers.

UNIT I SCIENCE OF MEASUREMENTS AND CLASSIFICATION OF TRANSDUCERS 9

Units and standards – Static calibration – Classification of errors, Limiting error and probable error – Error analysis – Statistical methods – Odds and uncertainty – Classification of transducers – Selection of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics: - Accuracy, precision, resolution, sensitivity, linearity, span and range. Dynamic characteristics: Mathematical model of transducer, Zero, I and II order transducers, Response to impulse, step, ramp and sinusoidal inputs.

UNIT III VARIABLE RESISTANCE TRANSDUCERS 9

Principle of operation, construction details, characteristics and applications of potentiometer, strain gauge, resistance thermometer, Thermistor, hot-wire anemometer, piezo-resistive sensor and humidity sensor.

UNIT IV VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS 9

Inductive transducers: – Principle of operation, construction details, characteristics and applications of LVDT, Induction potentiometer – Variable reluctance transducers – Synchros – Microsyn – Principle of operation, construction details, characteristics of capacitive transducers – Different types & Signal Conditioning – Applications:- Capacitor microphone, Capacitive pressure sensor, Proximity sensor.

UNIT V OTHER TRANSDUCERS 9

Piezoelectric transducer – Hall Effect transducer – Magneto elastic sensor – Digital transducers – Fiber optic sensors – Thick & Thin Film sensors (Bio sensor & Chemical Sensor) – Environmental Monitoring sensors (Water Quality & Air pollution) – Introduction to MEMS – Introduction to Smart transducers and its interface standard (IEEE 1451).

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of the course, the student should have the ability:

1. Ability to apply the mathematical knowledge and science & engineering fundamentals gained to solve problems pertaining to measurement applications.
2. Ability to analyze the problems related to sensors & transducers.
3. Ability to select the right sensor/transducer for a given application.
4. Ability to determine the static and dynamic characteristics of transducers using software packages.
5. Ability to understand fiber optic sensor and applications.
6. Ability to understand smart traducer and its standard.

TEXT BOOKS

1. Doebelin E.O. and Manik D.N., “Measurement Systems”, 6th Edition, McGraw-Hill Education Pvt. Ltd., 2011.
2. Neubert H.K.P., Instrument Transducers – An Introduction to their Performance and Design, Oxford University Press, Cambridge, 2003

REFERENCES

1. Bela G.Liptak, Instrument Engineers’ Handbook, Process Measurement and Analysis, 4th Edition, Vol. 1, ISA/CRC Press, 2003.
2. D. Patranabis, Sensors and Transducers, 2nd edition, Prentice Hall of India, 2010. E.A.
3. John P. Bentley, Principles of Measurement Systems, III Edition, Pearson Education, 2000.
4. W.Bolton, Engineering Science, Elsevier Newnes, Fifth edition, 2006.
5. Murthy, D.V.S., Transducers and Instrumentation, 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
6. Ian Sinclair, Sensors and Transducers, 3rd Edition, Elsevier, 2012.

CS8392 OBJECT ORIENTED PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment **-** Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 8

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

1. Develop Java programs using OOP principles
2. Develop Java programs with the concepts inheritance and interfaces
3. Build Java applications using exceptions and I/O streams
4. Develop Java applications with threads and generics classes
5. Develop interactive Java programs using swings

TEXT BOOKS

1. Herbert Schildt, “Java The complete reference”, 8th Edition, McGraw Hill Education, 2011.
2. Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

REFERENCES

1. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.
2. Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

EI8361	MEASUREMENTS AND TRANSDUCERS LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVES

- To make the students aware of basic concepts of measurement and operation of different types of transducers.
- To make the students conscious about static and dynamic characteristics of different types of transducer.
- To make the students to analyze step response of RTD
- To the student to measure resistance using bridge circuits
- To make the students to calibrate the electrical instruments

LIST OF EXPERIMENTS

1. Displacement versus output voltage characteristics of a potentiometric transducer.
2. Characteristics of Strain gauge and Load cell.
3. Characteristics of LVDT, Hall Effect transducer and Photoelectric tachometer.
4. Characteristics of LDR, thermistor and thermocouple (J, K, E types).
5. Step response characteristic of RTD and thermocouple.
6. Temperature measurements using RTD with three and four leads.
7. Wheatstone and Kelvin’s bridge for measurement of resistance.
8. Schering Bridge for capacitance measurement and Anderson Bridge for inductance measurement.
9. Measurement of Angular displacement using resistive and Capacitive transducer.
10. Calibration of Single-phase Energy meter and wattmeter.
11. Calibration of Ammeter and Voltmeter using Shunt type potentiometer.

Minimum of ten experiments to be offered from the list. Additional one or two experiments can be framed beyond the list or curriculum

TOTAL : 60 PERIODS

COURSE OUTCOMES (COs)

1. Understand the concepts of measurement, error and uncertainty.
2. Understand the static and dynamic characteristics of measuring instruments.
3. Gain knowledge about the principle of operation and characteristics of different types of resistance, capacitance and inductance transducers.
4. Acquire knowledge of analyzing different stages of signal conditioning units.
5. Ability to interpret the results and draw meaningful conclusions.
6. Ability to work as a member of a team while carrying out experiments.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Experimental setup for
Measurement of Linear displacement using Potentiometer
Strain gauge and Load cell characterisation and application
LVDT characterisation and application
Hall Effect characterisation and application
Measurement of Angular displacement
Muffle furnace
Thermistor characterisation and application
Various types of Thermocouple and RTD characterisation and application
Measurement of power and energy
Sufficient number of power supply, Galvanometer, Bread board, Multimeter, resistors, Decade Capacitance box, Decade resistance box, Decade Inductance box, CRO.

CS8382	**OBJECT ORIENTED PROGRAMMING LABORATORY**	**LT P C 0 0 4 2**

COURSE OBJECTIVES

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.
- To develop applications using generic programming and event handling.

List of experiments

1. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection(i.e domestic or commercial). Compute the bill amount using the following tariff. If the type of the EB connection is domestic, calculate the amount to be paid as follows:
    - First 100 units - Rs. 1 per unit

- 101-200 units - Rs. 2.50 per unit
- 201 -500 units - Rs. 4 per unit
- > 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

- First 100 units - Rs. 2 per unit
- 101-200 units - Rs. 4.50 per unit
- 201 -500 units - Rs. 6 per unit
- > 501 units - Rs. 7 per unit

2. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.
3. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
4. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.
5. Write a program to perform string operations using ArrayList. Write functions for the following

   a. Append - add at end
   b. Insert – add at particular index
   c. Search
   d. List all string starts with given letter
6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
7. Write a Java program to implement user defined exception handling.
8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
10. Write a java program to find the maximum value from the given type of elements using a generic function.
11. Design a calculator using event-driven programming paradigm of Java with the following options.

    a) Decimal manipulations
    b) Scientific manipulations
12. Develop a mini project for any application using Java concepts.

TOTAL : 60 PERIODS

COURSE OUTCOMES

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

- Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.
- Develop and implement Java programs with arraylist, exception handling and multithreading .
- Design applications using file processing, generic programming and event handling.

1 ANNA UNIVERSITY, CHENNAI AFFILIATED INSTITUTIONS B.E. MECHANICAL ENGINEERING REGULATIONS â€“ 2017 CHOICE BASED CREDIT SYSTEM CURRICULA AND SYLLABI 1. PROGRAMME EDUCATIONAL OBJECTIVES: Bachelor of Mechanical Engineering curriculum is designed to impart Knowledge, Skill and Attitude on the graduates to 1. Have a successful career in Mechanical Engineering and allied industries.Â 4. Practice their profession with good communication, leadership, ethics and social responsibility. 5. Graduates will adapt to evolving technologies through life-long learning. 2. PROGRAMME OUTCOMES 1. An ability to apply knowledge of mathematics and engineering sciences to develop mathematical models for industrial problems. Based on the deep analysis of the sufficiency of the high-quality liquid assets denominated in Russian roubles in the financial system, the CBR decided to use two alternative liquidity approaches: Option 1 (contractual committed liquidity facilities) and Option 2 (foreign currency HQLA to cover domestic currency liquidity needs). For that purpose, the terms of contractual committed liquidity facilities were designed. The phase-in arrangements for the LCR allowed by the Basel III rules are provided for in the national regulation.Â CBR press release â€œOn realisation of Basel III and on regulation of systemically important credit institutionsâ€ published on 15 July 2015; CBR press release â€œOn normative acts approved by the Board of Directors of the CBRâ€ published on 30 November 2015 Anna University, Chennai Affiliated Institutions Regulations â€“ 2017 Choice Based Credit System B.E. Electrical And Electronics Engineering Educational Objectives. Uploaded by. Immanuel Vinoth.Â Anna university, chennai affiliated institutions regulations â€“ 2017 choice based credit system b.e. electrical and electronics engineering curriculum I to VIII semesters and syllabus I & II semesters semester I. Course. Contact. Choice based credit system curricula and syllabi. Semester I. S.No.Â Subsurface investigation and instrumentation. Lt p C 3003. OBJECTIVES: Ð‡ Students are expected to understand the importance of site investigation, planning of sub soil investigation, interpretation of investigated data to design suitable foundation system. Unit I. Planning of exploration and geophysical methods.Â Ð‡ Based on the knowledge gained student will be in a position to identify and evaluate the deficiencies if any in the deposits of the given project area and capable of providing alternative methods to improve its quality so that the structures built on it will be stable and serve the intended purpose. Choice based credit system. Curriculum and detailed syllabi. For. B.E DEGREE (Computer Science and Engineering) PROGRAMME.Â Graduates will be able to successfully pursue higher education in reputed institutions. Graduates will have the ability to adapt, contribute and innovate new technologies and systems in the key domains of Computer Science and Engineering. Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.Â Engineering Knowledge: Ability to apply the knowledge of Mathematics, Science and Computer Science and Engineering to solve complex engineering problems related to the design, development, testing and maintenance of computing systems. PO2.