

II B.Tech I Semester(R09) Supplementary Examinations, May 2011

ADVANCED DATA STRUCTURES

(Electronics & Computer Engineering, Computer Science & Systems Engineering, Information Technology, Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

**Answer any FIVE questions
All questions carry equal marks**

1. (a) What is a friend function? What are the merits and demerit of using friend function?
(b) Explain the different types of constructors in C++.
2. (a) What is Dynamism? Explain any three kinds of dynamism for object-oriented design with an example for each.
(b) What is Compile time polymorphism? Explain with an example.
3. (a) What characteristics should a good algorithm possess?
(b) Analyse the time and space complexity for recursive binary search algorithm.
4. (a) Describe Type declaration for separate chaining hash table.
(b) Discuss Linear Probing.
5. With suitable diagram, explain the principle of Priority Queue.
6. (a) Give the linked list representation of a binary search tree. What are the operations performed on a binary tree.
(b) It is required to build a binary search tree with a set of data. Write a function for inserting an item into a binary search tree. Use this function to build a tree from a given set of data as input.
7. (a) Explain about Splay trees.
(b) Write short notes on B-trees.
8. Explain Brute force algorithm with example. Also write a C++ program to implement it.

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
PROBABILITY & STATISTICS
 (Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
 All questions carry equal marks
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1. (a) There are 12 cards numbered 1 to 12 in a box, if two cards are selected what is the probability that sum is odd.
 - i. With replacement
 - ii. Without replacement.
- (b) Three machines I,II,III produce 40%, 30%, 30% of the total number of items of factory. The percentages of defective items of these machines are 4%, 2%, 3%. If an item is selected at random, find the probability that the item is defective.
2. (a) If X and Y are discrete random variables and K is a constant then prove that
 - i. $E(X+K)=E(X)+K$
 - ii. $E(X+Y)=E(X)+E(Y)$
- (b) Let the continuous random variable X have the probability density function,
 $f(x) = \frac{2}{x^3}, if 1 < x < \infty$, otherwise 0. find F(x).
3. (a) Define poisson distribution and derive its mean and variance.
- (b) Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63.
4. A population consists of six numbers 4,8,12,16,20,24. Consider all samples of size two which can be drawn without replacement from this population. Find
 - (a) Population mean
 - (b) Population S.D
 - (c) Mean of the sampling distribution of means
 - (d) S.D of the sampling distribution of means.
5. (a) A random sample of 400 items is found to have mean 82 and S.D of 18.7. Find the maximum error of estimation at 95% confidence interval. Find the confidence limits for the mean if $\bar{x}=82$?
- (b) Measurements of the weights of a random sample of 200 ball bearings made by a certain machine during one week showed a mean of 0.824 and a.s.D of 0.042. Find maximum error at 95% confidence interval. Find the confidence limits for mean if $\bar{x}=32$?
6. (a) Explain the procedure generally followed in testing of hypothesis.
- (b) In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers.
7. Producer of 'gutkha' claims that the nicotine content in his 'gutkha' on the average is 1.83mg. can this claim be accepted if a random sample of 8 'gutkha' of this type have the nicotine contents of 2.0, 1.7, 2.1, 1.9, 2.2, 2.1, 2.0, 1.6mg ? use 0.05 l.o.s.
8. (a) Assume that both arrival rate and service rate following poisson distribution. The arrival rate and service rate are 25 and 35 customers /hour . respectively at a single window in RTC reservation counter. Find
 - i. ρ
 - ii. L_S
 - iii. L_q
 - iv. W_S
 - v. W_q
- (b) Explain the general properties of engineering system.

**II B.Tech I Semester(R09) Supplementary Examinations, May 2011
BASIC ELECTRICAL ENGINEERING**

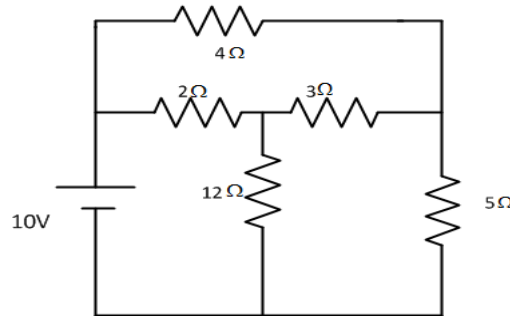
(Computer Science and Engineering, Information Technology, Computer Science & Systems
Engineering)

Time: 3 hours

Max Marks: 70

**Answer any FIVE questions
All questions carry equal marks**

1. (a) State and explain ohm's law
(b) Three resistances 2Ω , 4Ω and 6Ω are connected in series across a voltage supply voltage across 2Ω resistor is $4V$. Find the voltage across remaining resistances and total voltage.
2. (a) State and explain superposition theorem
(b) Find the current supplied by $10V$ battery by using star-Delta transformation.



3. (a) Derive an expression for average value of an AC current wave form $I = E_m \sin \theta$
(b) An alternating current is expressed as $I = 14.14 \sin 314t$. Determine.
 - i. Maximum current
 - ii. rms current
 - iii. Frequency
 - iv. Instantaneous current when $t = 0.02\text{msec}$.
4. Define efficiency and Regulation. Explain how will you pre-determine the efficiency and regulation with neat circuit diagrams.
5. (a) Explain the principle of operation of DC generator
(b) A lap wound DC generator having 80 slots with 10 conductors per slot generator at no load emf of $400v$, when running at 1000 rpm . At what speed should it be rotated to generate a voltage of $220v$ on open circuit.
6. (a) Derive the torque equation of a DC motor
(b) A $100v$ series motor taken $45A$ when running at 750 rpm . Its armature resistance is 0.22 ohm while the series field resistance is 0.13 ohms Iron and frictional losses amounts to $750w$. Find the shaft power.
7. (a) Explain with the help of diagram how a rotating magnetic field is produced in a 3- phase Induction Motor.
(b) A 3-phase , 6 pole, 50HZ induction motor develops 4 KW including friction and windage losses at 950 rpm . If the stator loss is $250w$. find the rotor frequency.
8. Explain the construction and operation of permanent magnet moving coil instruments with a neat diagram.

II B.Tech I Semester(R09) Supplementary Examinations, May 2011

ELECTRONIC DEVICES & CIRCUITS

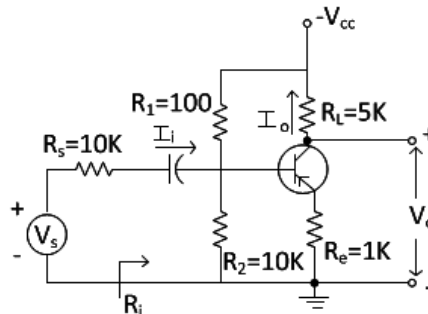
(Electronics & Instrumentation Engineering, Electronics & Control Engineering, Electronics & Communication Engineering, Electronics & Computer Engineering, Computer Science & Systems Engineering, Information Technology, Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- Discuss PN diode VI characteristics with neat sketch.
 - Calculate the factor by which the current will increase in a silicon diode operating at a forward voltage of 0.4Volts, when the temperature is raised from 25 C to 150 C.
- With circuit and necessary waveforms explain the operation of Bridge Rectifier.
 - Design a filter for FWR circuit with LC filter to provide an output voltage of 10 Volts with a load current of 200mA and the ripple is limited to 2%.
- With neat sketch explain the different current components of transistor.
 - In an NPN transistor emitter is grounded, base is connected with 4 Volts supply in series with 100 K ohms resistor and collector base is connected with 4 Volts supply in series with 2K ohms. Assume $V_{CC} = 12\text{Volts}$, $V_{BE} = 0.7 \text{ Volts}$, $\beta = 100$. Find I_B, I_C and I_E
- Explain diode compensation circuit for variations in I_C for self bias circuit.
 - How self bias circuit will eliminate drawbacks in fixed bias circuit.
- With neat structure explain the principle of operation of depletion MOSFET.
 - Explain drain characteristics of JFET.
- Derive an expression for voltage gain, Input Impedance and output impedance of CG amplifier at low frequencies.
 - In an N - channel JFET based voltage divider common drain configuration, determine the value of resistor R_s so as to have the operating point as $I_{DQ} = 5\text{mA}$, $V_{DSQ} = 10\text{V}$. Given that $V_{DD} = 28 \text{ V}$, $R_1 = 1 \text{ M ohms}$, $R_2 = 0.5 \text{ M ohms}$, saturation drain current of the FFET is 10 mA and gate source pinch off voltage is '-5V'.
- For the transistor amplifier shown below, Compute $A_I = I_0/I_i$, A_v , A_{vs} and R_i . Assume $h_{ie} = 1100 \text{ ohms}$, $h_{fe} = 50$, $h_{re} = 2.5 * 10^{-4}$ $h_{oe} = 24\mu\text{A/V}$



- Discuss the principle of operation of
 - Varactor Diode
 - LED
 - LDR

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
DIGITAL LOGIC DESIGN
 (Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
 All questions carry equal marks

1. (a) Convert the following numbers:
 - i. $(4D.56)_{16} = ()_2$
 - ii. $(231)_4 = ()_{10}$
 (b) Perform the following binary multiplication operations
 - i. $100010 \times 001010 =$
 - ii. $000100 \times 010101 =$
 (c) Explain about error detecting codes with examples?
2. (a) If $\overline{AB} + C\overline{D} = 0$, then prove that $AB + \overline{C}(\overline{A} + \overline{D}) = AB + BD + \overline{BD} + \overline{A} \overline{C} D$.
 (b) Realize $Y = A + BC\overline{D}$ using NAND gates.
 (c) Explain about Positive, Negative and mixed logic in binary signals.
3. (a) Using the K-map method. Simplify the following function and obtain
 - i. Minimal SOP and
 - ii. Minimal POS expressions
$$Y = \sum_m (0, 2, 3, 6, 7) + \sum_d (8, 10, 11, 15)$$
 (b) Realize the following function as
 - i. Multi level NAND-NAND gate network and
 - ii. Multi level NOR-NOR network.
$$f = B(A + CD) + A\overline{C}$$
4. (a) A combinational logic circuit is defined by the following Boolean functions.
 $F_1 = \overline{ABC} + AC, F_2 = \overline{ABC} + \overline{AB}, F_3 = \overline{ABC} + AB$
 Design the circuit with a decoder and external gates.
 (b) Design a circuit to convert Excess-3 code to BCD code using a 4-bit Full adder.
5. (a) Write the HDL behavioral Description of a
 - i. D Flip-Flop
 - ii. T Flip Flop
 (b) Draw the circuit diagram of J-K Flip flop with NAND gates with positive edge triggering and explain its operation with the help of truth table. How race around condition is eliminated?
6. (a) Explain Synchronous and ripple counters compare their merits and demerits.
 (b) Draw the block diagram and explain the operation of serial transfer between two shift register and draw its timing diagram.
7. (a) Explain the block diagram of a memory unit. explain the read and write operation a RAM can perform.
 (b) Derive the PLA programming table and the PLA structure for the combinational circuit that squares a 3-bit number. Minimize the no. of product terms.
8. (a) Describe the design procedure for Asynchronous sequential circuits.
 (b) Obtain a static hazard free asynchronous circuit for the following switching function
 $f(A, B, C) = \overline{Z}_m(1, 3, 6, 7)$

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
 (Common to Computer Science & Engineering, Information Technology, Computer Science
 & Systems Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

1. (a) Explain the law of duality
 (b) Explain the terms of equivalence.
2. (a) prove or disprove the validity of the argument:
 Some dogs are animals.
 Some cats are animals.
 Therefore some dogs are cats.
 (b) Prove:
 Babies are illogical
 Nobody is disposed who can manage a crocodile
 Illogical persons are disposed
 Therefore Babies cannot manage crocodiles.
3. (a) What is a relation ? Explain the properties of relations ?
 (b) What are the operations on relations ?
4. (a) Explain about groupoid , semigroup and Monoid .
 (b) A binary operation $*$ is defined on Z by
 $a * b = a + b - a b$, $a, b \in Z$ show that $(z, *)$ is a semi group.
5. (a) Find a generating function for a_r for the number of ways the sum r can be obtained when 10 distinguishable dice are rolled?
 (b) Solve the recurrence relation using characteristic roots $a_n + 5a_{n-1} + 5a_{n-2} = 0$, with $a_0 = 0$, $a_1 = 2\sqrt{5}$.
6. In how many ways can we draw a heart or a spade from an ordinary deck of playing cards? A heart or an ace? An ace or a king? A card numbered 2 through 10? A numbered card or a king?
7. (a) Explain the adjacency matrix representation of a graph with an example?
 (b) Prove that a connected graph of n vertices and m edges has $n-1$ branches and $m-n+1$ chord?
8. (a) How many vertices are needed to construct a graph with 7 edges in which each vertex is of degree 2?
 (b) Define Hamilton graph. Illustrate with an example?
