Code: 9A05302

R09

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

ADVANCED DATA STRUCTURES

(Common to ECC, CSS, IT & CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Describe the data types supported by C++.
(b) Write a program to arrange the given set of numbers in ascending order using pointer.

2 (a) Write a program in C++ to illustrate the multiple inheritance concepts.
(b) Explain the concepts of function overloading and operator overloading with an example.

3 (a) What characteristics should a good algorithm possess?
(b) Analyze the time and space complexity for recursive binary search algorithm.

4 (a) What is hashing? Explain an instance where hashing technique is used.
(b) Compare time complexities of linear search, binary search and searching from hash tables.

5 (a) Discuss in brief the working of heap sort algorithm.
(b) Write notes on priority queue.

6 (a) Write algorithms to implement the basic binary search tree operations-search, delete.
(b) Explain the concepts for performing single and double rotations of AVL Trees?

7 (a) How do you find height of B-tree? Explain.
(b) Analyze the time complexity of Red-black tree.

8 Analyze the time complexity of Knuth-Morris-Pratt algorithm.

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Code: 9ABS304

R09

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

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) What is the probability of picking an ace and a king from a 52 cards deck?
(b) For any three events A, B and C defined on the sample space S such that $B \subset C$ and P(A) > 0, show that P(B/A) $\leq$ P(C/A).

2 (a) A random variable x has the following probability distribution

x_i	-2	-1	0	1	2	3
$f(x)=P(X=x_i)$	0.1	k	0.2	2k	0.3	k

Find: (i) the value of k (ii) mean (iii) variance (iv) $P(x \geq 2)$ (v) P(x<2) (vi) P(-1<x<3).

(b) Out of 24 mangoes 6 are rotten, 2 mangoes are drawn obtain the probability distribution of the number of rotten mangoes that can be drawn.

3 A manufacturer of pins knows that 2% of his product is defective. If he sells pins in boxes of 100 and guarantees that not more than 4 pins will be defective. What is the probability that a box will fail to meet the guaranteed quantity?

4 A random sample of size 100 is taken from an infinite population having the mean $\mu = 76$ and the variance $\sigma^2 = 256$. What is the probability that $\bar{x}$ will be between 75 and 78?

5 (a) Define estimate, estimator and estimation.
(b) In how many ways the estimation can be done and what are they. Explain in detail.

6 (a) Write a short note on type –I and type – II errors.
(b) In a random sample of 125 cool drinkers, 68 said they prefer Thumsup to Pepsi. Test the null hypothesis P = 0.5 against the alternative hypothesis P > 0.5.
(c) An ambulance service claims that it takes on average less than 10 min. to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 min. and a variance of 16 min. Test the significance at 0.05 level.

7 The nicotine contents in milligrams in two samples of tobacco were found to be as follows:

Sample A	24	27	26	21	25	-
Sample B	27	30	28	31	22	36

Can it be said that the two samples have come from the same normal population.

8 (a) Explain about Poisson distribution in the queuing system.
(b) Explain about exponential distribution in the queuing system.

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Code: 9A02306

R09

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

BASIC ELECTRICAL ENGINEERING

(Common to CSS, IT & CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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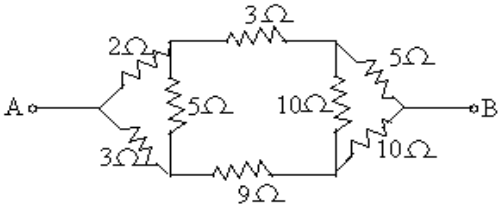
1 (a) Define ohm's law and give its limitations.
(b) A current of 10 A flows through a resistor for 10 min. and the power dissipated by the resistor is 100 W. Find the p.d. Across the resistor and the energy supplied to the circuit.
(c) Four resistors of 2 ohm, 3 ohm, 4 ohm & 5 ohm respectively, are connected in parallel. What potential difference must be applied to the group in order that total power of 100 W may be absorbed?

2 (a) Find the equivalent resistance between the terminals A and B of network shown in figure:



Figure

(b) State and explain superposition theorem.

3 A coil A having a resistance of 10 ohms and inductance of 0.2 Henry is connected in series with another coil B having a resistance of 30 ohms and inductance 0.1H. The two coils in series are fed form 200 V, 50 HZ supply. Determine the voltage across each coil, power dissipated in each coil, and the power factor of the combined series circuit: Draw the phasor diagram.

4 Discuss the constructional details of single - phase transformer and hence obtain the expression induced emf of a transformer.

5 The resistance of the field circuit of a shunt wound dc generator is 200 ohms. When the output of the generator is 100 kW, the terminal voltage is 500 V and the generated emf is 525 V. Calculate: (a) the armature resistance, and (b) the value of the generated emf when the output is 60 kW, with a terminal voltage of 520 V.

6 A 200 V DC shunt motor takes a total current of 100 A and runs at 750 rpm. The resistance of the armature winding and shunt field winding is 0.1 ohms and 40 ohms respectively. Find the copper losses. If the friction and iron losses amount to 1500 W, also calculate shaft power, shaft torque and efficiency.

7 The power input to the rotor of a 220 V, 60 Hz, 3-phase, 6-pole induction motor is 50 kW. It is observ that the rotor emf makes 150 complete cycles per minute. Calculate:
(i) Rotor frequency. (ii) Synchronous speed.
(iii) Slip. (iv) Rotor speed.

8 Explain the moving iron repulsion type instrument with a neat diagram.

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Code: 9A04301

R09

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

ELECTRONIC DEVICES & CIRCUITS

(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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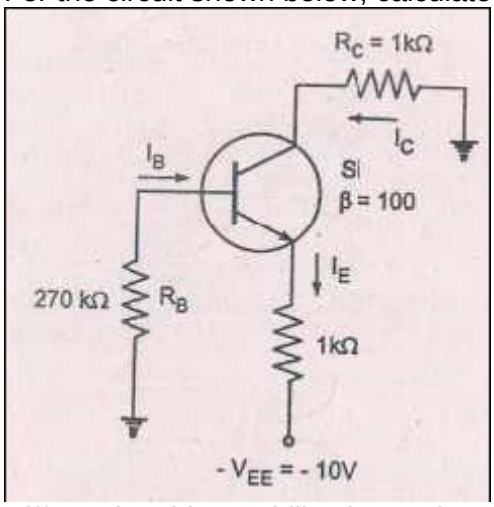
1 (a) What are the various applications of p-n junction diode? Explain them.
(b) What are the specifications of p-n junction diode? Explain how reverse saturation current varies with temperature both in Silicon and Germanium diodes.

2 (a) Calculate the value of capacitance to use in a capacitor filter connected to a full wave rectifier operating at a standard aircraft power frequency of 400 Hz, if the ripple factor is 10% for a load of 500 Ω
(b) Design a filter for full wave circuit with LC filter to provide an output voltage of 10 V with a load current of 200mA and the ripple is limited to 2%.

3 (a) The current gain of a transistor in CE circuit is 49. Calculate CB current gain and find the base current where the emitter current is 3mA.
(b) With neat diagram explain transistor current components.

4 (a) For the circuit shown below, calculate I_B, V_C and V_{CE}.

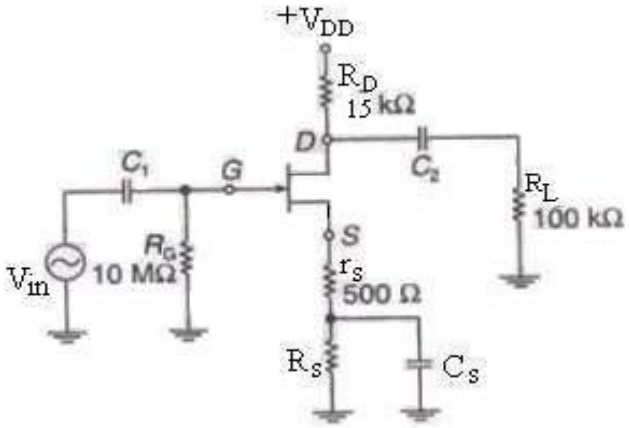


(b) Differentiate bias stabilization and compensation techniques.

5 (a) Explain the principle of MOSFET in depletion mode with neat sketches and o/p characteristics.
(b) Write about the broad classification of FET.

Contd. in Page 2

6 (a) The figure shown below is a swamped FET amplifier. Determine the voltage gain when R_L=100 K. Neglect the FET output resistance (r_d). Take g_m = 4mS.



(b) How should the gate-source junction of a JFET be biased? Explain how the potential applied to this junction controls the drain current.

7 Derive the equations of current gain A_I, voltage gain A_V, input impedance Z_i, output impedance Y_0, voltage gain with R_s(A_{VS}), current gain with R_s (A_{IS}) using a general two port active network.

8 (a) Draw the V-I characteristics of an SCR and explain it in detail.

(b) Obtain the relation between peak-point voltage 'V_P ' on the UJT characteristics, supply voltage 'V_{BB}', Intrinsic stand-off ratio 'η ' and the barrier potential of P-N junction. Explain the significance of peak-point voltage on switching action of UJT device.

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Code: 9A04306 **R09**

II B.Tech I Semester (R09) Supplementary May 2012 Examinations
DIGITAL LOGIC DESIGN
(Computer Science & Engineering)

Time: 3 hours **Max. Marks: 70**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Convert the following to binary & then to gray code
   (i) $AB33_{16}$ (ii) 1764_8.
   (b) Write a short note on weighted and non-weighted codes.
   (c) Subtract the following numbers using the 2's complement method.
   (i) +39-(+16) (ii) -33-(-57)

2. (a) Simplify the following expressions
   (i) $AB + \overline{AC} + A\overline{B}C(AB + C)$
   (ii) $\overline{A\overline{B} + ABC} + A(B + A\overline{B})$
   (b) Express the function $Y = A + \overline{B}\,C$ in
   (i) Canonical sop and
   (ii) Canonical pos form.
   (c) What is meant by duality in Boolean algebra.

3. (a) Draw the logic circuit for the following function using NOR gates, $Y = A + (B + \overline{C})(\overline{D}E + F)$.
   (b) Obtain minimal sum of products expression for the following function and implement the same using universal gates
   $$f(A, B, C, D) = \Sigma(0,2,3,5,7,8,13) + \Sigma_d\,(1,6,12)$$

4. (a) Explain carry propagation in parallel adder with a neat diagram.
   (b) Implement 64 x 1 multiplexer with four 16 x 1 and one 4 x 1 multiplexer. (use only block diagram)

5. (a) Realize D-latch using R-S latch. How it is different from D-flip flop. Draw the circuit using NAND gates and explain.
   (b) Find the equivalence partition and a corresponding reduced machine in standard form for the machine given below.

PS	NS,Z	
	X=0	X=1
A	E,0	D,1
B	F,0	D,0
C	E,0	B,1
D	F,0	B,0
E	C,0	F,1
F	B,0	C,0

6. (a) Design a 4-b ring counter using T-flip flops and draw the circuit diagram and timing diagrams.
   (b) Write a HDL behavioral description of shift register.

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7. (a) Explain briefly different types of R_0M_s.
   (b) Implement the following Boolean functions using PLA

$$A(x, y, z) = \Sigma(1,2,4,6),$$
$$B(x, y, z) = \Sigma(0,1,6,7)$$
$$C(x, y, z) = \Sigma(2,6)$$
$$D(x, y, z) = \Sigma(1,2,3,5,7)$$

8. (a) Design an asynchronous circuit that has two inputs x_1 and x_2 and one output z. The circuit is required to give an output whenever the input sequence (0,0) (0,1) and (1,1) received but only in that order.
   (b) Define Races in asynchronous sequential circuits.

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Code: 9A05301

R09

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSS, IT & CSE)

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) Verify the proposition (p ^ q) 7 (p v q) is a contradiction.
(b) Symbolize the following statements:
(i) X is the father of the mother of y.
(ii) All rational numbers are real numbers.

3 (a) What is a relation? Explain the properties of relations.
(b) What are the operations on relations?

4 (a) Explain about homomorphism.
(b) Prove that "Let θ: G→G" be a homomorphism. Then θ is one – one ⇔ K = ker θ = {e}.

5 (a) Solve the recurrence relation using generating function a_n-a_{n-1}= 2(n-1) for n ≥1 and a_0=3.
(b) Suppose there are n guests in a party. Each person shakes hands with everybody else exactly once. Deduce the recurrence relation for the number of handshakes that occur and solve the relation.

6 If a certain license plate require 3 English letters followed by 4 digits. How many different plates can be manufactured if repetition of letters and digits are allowed? How many plates are possible if repetition of letters only allowed? How many are possible if only the digits can be repeated? How many are possible if no repetitions are allowed?

7 (a) For any simple graph G, prove that the number of edges of G is less than or equal to n (n-1)/2, where n is the number of vertices in a graph.
(b) Define spanning tree and planar graph.

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.

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