

**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**

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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?

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**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**

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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.

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**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**  
**DIGITAL LOGIC DESIGN AND COMPUTER ORGANIZATION**  
**(Computer Science & Systems Engineering, Information Technology)**

Time: 3 hours

Max Marks: 70

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**All questions carry equal marks**

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1. (a) Explain the basic functional units of a computer and explain each unit in detail.  
(b) Determine the base of the numbers in each case for the following operations to be correct:
  - i.  $14/2=5$
  - ii.  $54/4=13$
  - iii.  $24+17=40$
2. (a) Explain why NOR is gate called Universal gate.  
(b) Prove the following Boolean expressions:  
 $(A + B)(A + B) = B$   
 $(A + C)(B + D) = AC + BD$
3. (a) Draw the block diagram of a quadruple 2-to-1 line multiplexer and explain its operation using function table.  
(b) What is a shift register? With a neat diagram explain the operation of a 4-bit shift register.
4. With an example explain how multiplication of two fixed point binary numbers using Booth's algorithm. Also draw the hardware circuit for implementing the same.
5. (a) What are conditional branch instructions? Explain the commonly used flags for conditional branching.  
(b) Discuss with examples three address instructions and one address instructions.
6. (a) Explain how the transfer of contents of register R1 to register R2 is accomplished.  
(b) Draw and explain the microinstruction sequencing organization.
7. (a) Differentiate between static RAM and Dynamic RAM.  
(b) Give a detailed note on organization of Cache Memory.
8. (a) Show the connection of I/O devices to the single-bus structure and explain.  
(b) Discuss the approach used to transfer large blocks of data at high speeds.

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**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**  
**DATA COMMUNICATION SYSTEMS**  
(Information Technology)

**Time: 3 hours**

**Max Marks: 70**

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1. (a) Briefly describe broadcast and point to point computer network.  
(b) List and briefly describe the five basic data communications network topologies.  
(c) Define the following terms: Information capacity, bits, bit rate, band and M-ary encoding.
2. (a) Explain how waves are propagated down a metallic transmission line.  
(b) Briefly describe the construction of an optical fiber cable.
3. (a) Define companding and explain analog and digital companding.  
(b) Describe wavelength-division multiplexing.
4. Explain about the satellite communication in microwave system.
5. (a) Discuss about the call progress tones and signals.  
(b) Explain the units of power measurements.
6. (a) Contrast the similarities and differences between two-way mobile radio and cellular telephone.  
(b) List and describe the three classifications of AMPS cellular telephone.
7. Clearly explain about error detection methods.
8. What are the two classifications for voice-band modem? Briefly explain each one.

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

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

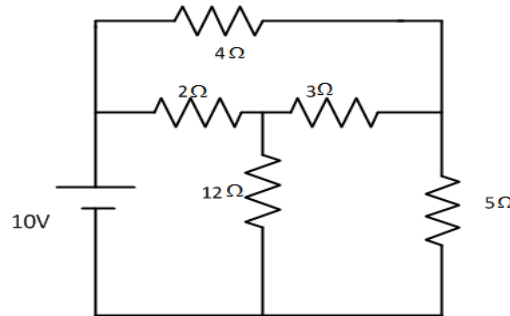
Time: 3 hours

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1. (a) State and explain ohm's law  
(b) Three resistances  $2\Omega$  ,  $4\Omega$  and  $6\Omega$  are connected in series across a voltage supply voltage across  $2\Omega$  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  $1000\text{ rpm}$ . 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  $750\text{ rpm}$ . Its armature resistance is  $0.22\text{ ohm}$  while the series field resistance is  $0.13\text{ ohms}$  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,  $50\text{HZ}$  induction motor develops  $4\text{ KW}$  including friction and windage losses at  $950\text{ rpm}$ . 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.

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

## ELECTRONIC DEVICES &amp; CIRCUITS

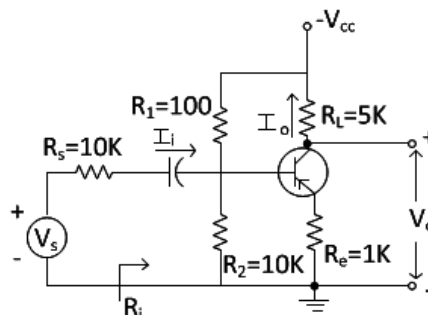
(Electronics & Instrumentation Engineering, Electronics & Control Engineering, Electronics & Communication Engineering, Electronics & Computer Engineering, Computer Science & Systems Engineering, Information Technology, Computer Science & Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions  
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- 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