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<b>R-11/R-13</b>
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**Code: 1GC33**

*II B.Tech. I Semester Supplementary Examinations November 2016*

**Probability & Statistics**

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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1. a) (i) Calculate the mean and standard deviation for the following 4M

Size of item	6	7	8	9	10	11	12
Frequency	3	6	9	13	8	5	4

- (ii) Calculate the median for the following frequency distribution

x	1	2	3	4	5	6	7	8	9
F	8	10	11	16	20	25	15	9	6

3M

- b) The following are the numbers of hours that 10 students studied for an examination and the scores that they obtained

No.of hours studied	8	5	11	13	10	5	18	15	2	8
Score	56	44	79	72	70	54	94	85	33	65

Calculate the rank correlation coefficient.

7M

2. a) Box A contains 5 red and 3 white marbles and box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of same color? 7M

- b) State and prove Baye's theorem. 7M

3. a) The diameter of an electric cable say X is assumed to be a continuous random variable with p.d.f  $f(x) = 6x(1-x)$   $0 \leq x \leq 1$ .
- (i) Check that above is a p.d.f
- (ii) Determine a number 'b' such that  $P(X < b) = P(X \geq b)$  7M

- b) A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number of defective items. 7M

4. a) In a large consignment of electric bulbs 10% are defectives. A random sample of 20 is taken for inspection. Find the probability that
- (i) All are good bulbs
- (ii) At most there are 3 defectives bulbs
- (iii) Exactly there are three defective bulbs. 7M

- b) A sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find
- (i) how many students score between 12 and 15
- (ii) how many score above 18
- (iii) how many score below 18 7M

5. a) If the population is 3, 6, 9, 15, 27
- List all possible samples of size 3 that can be taken without replacement from the finite population.
  - Calculate the mean of each of the sampling distribution of means.
  - Find the standard deviation of sampling distribution of means. 10M
- b) If two independent random samples of size  $m_1=13$ ,  $m_2=7$  are taken from a normal population. What is the probability that the variance of the first sample will be at least four times as large as that of the second sample? 4M
6. a) The mean and the standard deviation of a population are 11,795 and 14054 respectively. If  $n=50$ , find 95% confidence interval for the same. 7M
- b) A random sample of 100 teachers in a large metropolitan area revealed a mean weekly salary of Rs. 487 with a standard deviation Rs 48. With what degree of confidence can we assert that the average weekly salary of all teachers in the metropolitan area is between 472 to 502? 7M
7. a) Two random samples gave the following data

	size	mean	variance
Sample I	8	9.6	1.2
Sample II	11	16.5	2.5

- Can we conclude that the two samples have been drawn from the same normal population? 8M
- b) Explain the following with examples
- Null hypothesis
  - Type – I error
  - Type – II error 6M
8. a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same at 5% level. 7M
- b) In a pre-poll survey out of 1000 urban voters 540 favoured B and the rest A. Out of 1000 rural voters, 620 favoured A and the rest B. Examine if the nature of the area is related to voting performance using the Chi-square test. 7M

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Code: 1G235

II B.Tech. I Semester Supplementary Examinations November 2016

**Basic Electrical Engineering**

(Common to CSE &amp; IT)

Max. Marks: 70

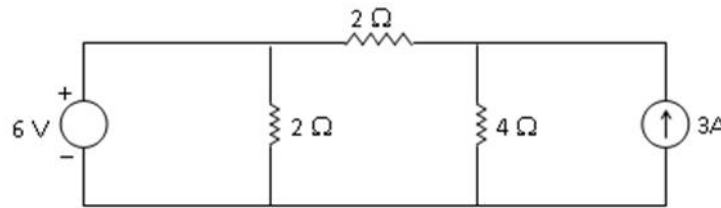
Time: 3 Hours

Answer any **five** questions

All questions carry equal marks (14 Marks each)

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1. a) Explain the effect of Temperature on Resistance? 7M
- b) A circuit consisting of three resistances of  $12\Omega$ ,  $18\Omega$  and  $36\Omega$  respectively joined in parallel is connected in series with a fourth resistance. The whole circuit is applied with  $60V$  and it is found that the power dissipated in the  $12\Omega$  resistor is  $36W$ . Determine the value of the fourth resistance and the total power dissipated in the circuit. 7M
2. a) State and explain maximum power transfer theorem. With an example. 6M
- b) Determine the current in resistor  $4\Omega$  using superposition theorem as shown in figure.



8M

3. a) Define and explain **i)** RMS value, **ii)** Average value and **iii)** Form factor **iv)** peak factor. Also derive the expression of a sinusoidal wave 6M
- b) A resistance of  $20\Omega$  and an inductance of  $0.2H$  and a capacitance of  $100\mu F$  are connected in series across  $220V$ ,  $50Hz$  mains. Determine: **(i)** impedance of the circuit. **(ii)** Current taken from the mains and **(iii)** power and power factor of the circuit. 8M
4. a) Derive the relation between phase and line values of a 3-phase balanced delta connected system 7M
- b) Three impedances each of  $(5+j12)\Omega$  are connected in star to a  $220V$ , 3-phase, and  $50Hz$  supply. Calculate the line currents 7M
5. a) Derive the emf equation of a dc generator 6M
- b) A 4 pole DC Generator has 378 conductors in its armature. If the flux per pole is  $0.02Wb$  and the generator runs at  $1000rpm$ . Calculate the induced emf. If winding is connected in (i).lap winding (ii).wave winding 8M
6. a) Explain the constructional details of Transformer 7M
- b) The Maximum Flux Density in the case of  $250/3000V$   $50C/S$  single phase Transformer is  $1.2Wb/M^2$ . If The Emf per turn is  $8V$  determine **(i)** Primary turns **(ii)** Secondary turns **(iii)** Area of the core. 7M
7. a) Explain the principle of operation of induction motor 7M
- b) A 6 pole induction motor is fed by three phase  $50Hz$  supply and running with a Full load slip of  $3\%$ . Find the full load speed of induction motor and also the frequency of rotor emf. 7M
8. a) What are the basic requirements of indicating instrument? Briefly discuss them 7M
- b) Explain with neat sketch the principle of operation of permanent magnet type moving coil Instruments 7M

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Code: 1G334

II B.Tech. I Semester Supplementary Examinations November 2016

**Electronic Devices and Circuits**

(Common to CSE &amp; IT)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70Marks )

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1. a) Explain the operation of zener diode and how it is used as a voltage regulator? 8M
- b) An ideal silicon diode has a static resistance of  $4.57 \Omega$  while conducting  $42.5\text{mA}$  at  $T=300^\circ\text{K}$ . find the dynamic resistance of the diode for a forward voltage of  $0.1\text{V}$ . 6M
2. a) Explain the principle of operation of HWR with and without capacitor filter and draw the waveforms? What is the necessity of filter circuit in a rectifier? Derive an expression for ripple factor with a capacitor filter? 6M
- b) A  $230\text{V}$ ,  $50\text{Hz}$  voltage is applied to the primary of a  $5:1$  step down center-tapped transformer used in a full wave rectifier having a load of  $900 \Omega$ . If the diode resistance and secondary coil resistance together has a resistance of  $100 \Omega$ . Determine
  - (i) DC Voltage across the load
  - (ii) DC current flowing through the load
  - (iii) DC power delivered to the load
  - (iv) PIV across each diode 8M
3. a) With a neat diagram explain the various current components in a pnp transistor? 8M
- b) Compare the performance of a transistor in CE, CB and CC configuration? 6M
4. a) What is meant by thermal runaway and derive the condition for thermal stability in CE configuration? 6M
- b) Design a self-bias circuit, the Q-point is established at  $V_{CE} = 12\text{V}$  and  $I_C = 1.5\text{mA}$  so that  $S(I_{CO}) = 3$ . Assume  $\beta = 50$ ,  $V_{BE} = 0.7\text{V}$ ,  $V_{CC} = 22.5\text{V}$ . 8M
5. a) Draw and explain the transfer characteristics of N channel JFET? 7M
- b) Define  $R_d$ ,  $\mu$ ,  $g_m$  of JFET, and derive the relationship between them? 7M
6. a) Show that the maximum power conversion efficiency of class B push pull amplifier is  $78.5\%$ . 7M
- b) Derive the CC h-parameters in terms of CE h-parameters. 7M
7. a) Enumerate the effects of negative feedback on (i) Gain, (ii) Frequency response, (iii) Distortion, (iv) Noise and (v) input and out impedances 6M
- b) Calculate the voltage gain, input and output resistance of series shunt feedback configuration having open loop gain  $300$ ,  $R_i = 1.5\text{K}$ ,  $R_o = 50\text{K}$  and  $\beta = 1/15$ . 8M
8. a) Explain the working of a Wien bridge oscillator Derive the expression for frequency of oscillations and the value of gain required for sustained oscillations. 8M
- b) Show that the frequency of oscillations of a colpitt's oscillator

$$w_o = \sqrt{\frac{RC_1 + R_0(C_1 + C_2)}{LC_1C_2R_0}} \text{ where } R \text{ is the series resistance of an inductor } L. \quad 6\text{M}$$

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Hall Ticket Number :

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**R-11/R-13**

**Code: 1G132**

*II B.Tech. I Semester Supplementary Examinations November 2016*

### **Digital Logic Design**

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All questions carry equal marks (**14 Marks** each)

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1. Convert the following numbers from the given base to the other three bases indicated
  - (a) Decimal 225 to binary ,octal and hexadecimal
  - (b) Binary 1010111 to decimal ,octal and hexadecimal
  - (c) Octal 623 to decimal ,binary and hexadecimal
  - (d) Hexadecimal 2AC5 to decimal ,octal and binary 14M
  
2. Find the complement of the following Boolean functions and reduce them to a minimum number of literals
  - (a)  $(BC'+A'D) (AB'+CD')$
  - (b)  $B'D+A'BC'+ACD+A'BC$
  - (c)  $[(AB)'A] [(AB)'B]$
  - (d)  $AB'+C'D$  14M
  
3. a) Implement the following function with NAND gates:  
 $F(X,Y,Z) = (0,6)$  7M  
b) Simplify the Boolean function using karnaugh maps:  
 $F(X,Y,Z) = (0,2,4,5,6)$  7M
  
4. a) Implement a full – subtractor with two half-subtractors and an OR gate 7M  
b) Design the logic diagram of a 2-line to 4-line decoder using NOR gates 7M
  
5. a) What is register? Explain shift registers 7M  
b) Draw and explain ripple counter 7M
  
6. a) Draw and explain 4bit universal shift register 7M  
b) Design a BCD counter with JK flip-flops 7M
  
7. What is asynchronous circuit? Explain circuits with latches 14M
  
8. Explain programmable logic devices 14M

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Code: 1G131

II B.Tech. I Semester Supplementary Examinations November 2016

**Advanced Data Structures Through C++**

(Common to CSE &amp; IT)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll questions carry equal marks ( **14Marks** each )

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1. a) Explain different parameter passing methods with suitable examples. 7M
- b) What is a constructor? Illustrate default and parameterized constructors with suitable examples. 7M
2. a) What is the need for operator overloading? Illustrate with an example how binary operator can be overloaded? 7M
- b) What is inheritance? Explain multiple and multi-level inheritance. 7M
3. a) What is run time polymorphism? Explain with suitable example how to implement it using virtual functions? 6M
- b) What is a template class? Write a C++ program to implement queue ADT using a template class. 8M
4. Consider a hash table of size 7 with hash function  $h(k) = k \text{ mod } 7$ . Draw the table that results after inserting, in the given order, the following key values;
 

19, 26, 13, 48, 17

  - i) When collisions are handled by **linear probing**
  - ii) When collisions are handled by **double hashing** using a second hash function  $h^1(k) = 5 - (k \text{ mod } 5)$
  - iii) When collisions are handled by **separate chaining** 14 M
5. a) What is a priority queue? Explain how it can be realized using a heap data structure? 8M
- b) What is external sorting? Explain with suitable example polyphase merge sort. 6M
6. a) Create an AVL tree using the following data entered in the given order.
 

7, 10, 14, 23, 33, 56, 66, 70, 80

 8M
- b) What is a binary tree? Explain binary tree traversals with an example. 4M
7. a) Construct a B-tree of order 4 for the following data entered in the sequence;
 

92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78

 8M
- b) What is a red black tree? Explain how it differs from a binary search tree? 6M
8. a) Write and explain Boyer–Moore pattern matching algorithm with suitable algorithm. 8M
- b) Distinguish between Standard Tries and Compressed Tries. 6M

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<b>R-11/R-13</b>
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**Code: 1G133**

*II B.Tech. I Semester Supplementary Examinations November 2016*

**Mathematical Foundations of Computer Science**

(Common to CSE & IT)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions  
 All Questions carry equal marks (14 Marks each)  
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1. a) Prove that  $p \rightarrow (q \vee r)$  and  $(p \wedge \neg r) \rightarrow \neg q$  are logically equivalent 7M  
 b) If P, Q and R are three atomic variables, obtain the principal disjunctive normal form for  $(P \rightarrow (Q \vee R)) \vee (\neg P \rightarrow (Q \vee R))$  7M
  
2. Prove that the following is a valid argument:  

$$(p \Rightarrow q) \vee r \equiv (p \vee r) \Rightarrow (q \vee r)$$
 14M
  
3. a) Consider the set  $A = \{2, 7, 14, 28, 56, 84\}$  and the relation  $a \mid b$  if and only if  $a$  divides  $b$ . Give the Hasse diagram for the poset  $(A, \mid)$  14M
  
4. a) Let  $\phi : G \rightarrow H$  be an isomorphism. Show that  $\phi^{-1} : H \rightarrow G$  is an isomorphism. 7M  
 b) Let  $G$  be the cyclic group of order 12. How many subgroups of  $G$  have order 3? Explain. 7M
  
5. a) Among integers 1 to 1000, How many of them are not divisible by 3 nor by 5 nor by 7? 7M  
 b) Show that  $1^2 - 2^2 + 3^3 + \dots + (-1)^{n+1} n^2 = (-1)^{n+1} (n)^{n+1} / 2$  7M
  
6. Solve the recurrence relation  $a^n - 4a^{n-1} + 3a^{n-2} = 0$  for  $n \geq 2$  with initial conditions  $a_0 = 2$  and  $a_1 = 4$  by using generating functions. 14M
  
7. What are the steps involved in graph traversal using Breadth-First Search algorithm? Illustrate with an example. 14M
  
8. What is the chromatic number of a cycle graph and a complete graph of  $n$  vertices? 14M

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