

**Code: 5G431**

II B.Tech. I Semester Supplementary Examinations October 2020

**Discrete Mathematics**

( Common to CSE & IT )

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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**UNIT-I**

1. a) Define converse, contrapositive and inverse of an implication with examples. 5M  
 b) Construct truth table for  $((P \rightarrow R) \wedge (Q \rightarrow R)) \rightarrow ((P \vee Q) \rightarrow R)$  9M

**OR**

2. a) Obtain PDNF for  $(P \rightarrow Q) \vee (\sim P \rightarrow R) \rightarrow (Q \rightarrow R)$  using substitution method 7M  
 b) Show that  $R \rightarrow S$  can be derived from the premises  $P \rightarrow (Q \rightarrow S), \sim R \vee P$ , and  $Q$  by using rules of inference 7M

**UNIT-II**

3. a) Define Relation. Explain the properties of binary relations with examples. 7M  
 b) Let  $x = \{ 2,3,6,12,24,36 \}$  and the relation  $\leq$  be such that  $x \leq y$  if  $x$  divides  $y$ . Draw the Hasse diagram. 7M

**OR**

4. a) Define and explain semi groups and monoids with examples 7M  
 b) Define homomorphism and Explain the properties of Homomorphism. 7M

**UNIT-III**

5. If  $\circ$  is an operation on  $Z$  defined by  $x \circ y = x + y + 1$ , Prove that  $\langle Z, \circ \rangle$  is an abelian group. 14M

**OR**

6. a) Define Principle of Inclusion and Exclusion 7M  
 b) Suppose that 200 faculty members can speak French and 50 can speak Russian, while any 20 can speak both French and Russian. How many faulty members can speak either French or Russian? 7M

**UNIT-IV**

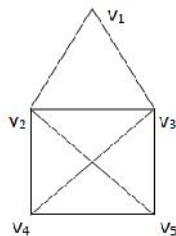
7. a) Find the generating function of  $(n-1)^2$  7M  
 b) Find co-efficient of  $x^{20}$  in  $(x^3 + x^4 + x^5 + \dots)^5$  7M

**OR**

8. 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

**UNIT-V**

9. a) Find the Chromatic number of following graph.



7M

- b) Define isomorphism with example. 7M

**OR**

10. Define the following terms with suitable examples. 14M  
 i) Euler Path  
 ii) Euler Circuit  
 iii) Multi Graph  
 iv) Hamiltonian Cycle

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**R-15**

**Code: 5G236**

II B.Tech. I Semester Supplementary Examinations October 2020

**Electrical Engineering and Electronics Engineering**

( Common to CSE & IT )

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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**UNIT-I**

1. a) Define the terms  
i) Electric Current ii) Potential Difference iii) Electric Power iv) Energy  
b) Three capacitors of 2 mF, 5 mF and 10 mF are connected in series. Find the equivalent capacitance.

**OR**

2. a) Define the Ohm's Law and its applications.  
b) State and explain Kirchoff's laws using neat diagrams.

**UNIT-II**

3. a) Explain the operation of principle of DC generator.  
b) Derive the expression for Torque in a DC Motor.

**OR**

4. a) Derive the emf equation of DC generator.  
b) A 4-pole, lap wound, DC generator has a useful flux of 0.07Wb per pole, armature consists of 440 numbers of conductors. Calculate the generated emf when it is rotated at a speed of 900 rpm with the help of prime mover.

**UNIT-III**

5. a) Explain the principle of operation of single phase Transformer with neat sketch.  
b) Explain Torque-Slip Characteristics of a Three phase induction motor.

**OR**

6. a) Derive the expression for E.M.F equation of a transformer.  
b) Explain the principle operation of a three phase induction motor with relevant diagrams

**UNIT-IV**

7. Explain the operation of Half wave rectifier with relevant diagrams.

**OR**

8. a) Explain the operation of P-N junction diode mentioning its applications.  
b) Explain the input and output characteristics of transistor in CE configuration.

**UNIT-V**

9. Describe how phase and frequency are measured by using Lissajous figures.

**OR**

10. a) Describe how voltage, current and time period are measured by using CRO.  
b) List the applications of CRO.

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**Code: 5GC33**

II B.Tech. I Semester Supplementary Examinations October 2020

**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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**UNIT-I**

1. a) A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card. 7M
- b) Suppose that a product is produced in three factories X, Y and Z. It is known that factory X produces thrice as many items as factory Y, and that factories Y and Z produce the same number of items. Assume that it is known that 3% of the items produced by each of the factories X and Z are defective while 5% of those manufactured by Y are defective. All the items produced in three factories are stocked, and an item of product is selected at random.
- (i) What is the probability that this item is defective?
- (ii) If an item selected at random is found to be defective, what is the probability that it was produced by factory Z. 7M

**OR**

2. For the continuous random variable X the probability density function is given by  $f(x) = cx(2-x)$  if  $0 \leq x \leq 2$ ,  $f(x) = 0$  otherwise where c is a constant. Find c, mean and variance. 14M

**UNIT-II**

3. A hospital switch board receives an average of 4 emergency calls in a 10 minute interval. What is the probability that
- (i) There are at most 2 emergency calls in a 10 minute interval
- (ii) There are exactly 3 emergency calls in a 10 minute interval 14M

**OR**

4. The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Find  $P(x = 1)$  and  $P(x > 2)$  14M

**UNIT-III**

5. a) A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative 7M
- b) A random sample of size 81 taken whose variance is 20.25 and mean is 32, construct 98% confidence interval 7M

**OR**

6. a) The variance of population is 2. The size of the sample collected from the population is 169. What is the standard error of mean 7M
- b) A research worker wants to determine the average time it takes a mechanic to rotate the tires of a car and he wants to be able to assert with 95% Confidence that the mean of his sample is of by at most 0.5 minutes. If he can presume from past experience that  $\sigma = 1.6$  minutes how large a sample will have to take 7M

**UNIT-IV**

7. The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches 14M

**OR**

8. The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sums of the squares of deviations from the mean are 26.94 and 18.73 respectively. Can the sample be considered to have been drawn from the same normal population 14M

**UNIT-V**

9. The random samples gave the following results

Sample	Size	Sample mean	Sum of squares of deviations from the mean
1	10	15	90
2	12	14	108

Test whether the samples came from the same normal population. 14M

**OR**

10. The number of automobile accidents per week in a certain community are as follows 12, 8, 20, 2, 14, 10, 15, 6, 9, and 4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period 14M

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**R-15**

**Code: 5G131**

II B.Tech. I Semester Supplementary Examinations October 2020

**Advanced Data Structures Through C++**

( Common to CSE & IT )

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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**UNIT-I**

1. a) What is the significance of constructors in class  
b) Explain defining friend Functions in C++ with example.

**OR**

2. a) Why memory is required while running an application dynamically?  
b) Explain dynamic memory allocation and de allocation in C++ with example.

**UNIT-II**

3. What is inheritance? Explain the different types of inheritance with examples.

**OR**

4. a) Explain in detail about operator and function overloading with an example.  
b) Define the notations below.  
i) Big Oh ii) Omega iii) Theta

**UNIT-III**

5. a) What is stack? Write the applications of Stack.  
b) Illustrate an implementation of stack ADT in C++ with example.

**OR**

6. a) What are the uses of hash functions?  
b) Explain linear probing and quadratic probing.

**UNIT-IV**

7. a) Explain multi-way merge sort with example  
b) Discuss the model for external sorting

**OR**

8. a) Discuss deletion operation on Binary Search Tree with example  
b) Discuss how elements are inserted into the AVL trees with example

**UNIT-V**

9. a) Write and explain Boyer-Moore pattern matching algorithm  
b) Write short note on compressed tries

**OR**

10. a) Give the application of B-Trees and mention the advantages and disadvantages of it.  
b) Write short note on splay trees

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<b>R-15</b>
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**Code: 5G132**

II B.Tech. I Semester Supplementary Examinations October 2020

**Digital Logic Design**

( 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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<b>UNIT-I</b>
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- 1. a) Convert the given Binary number 11011101 into
  - i. BCD
  - ii. Hexa-decimal
  - iii. Decimal

- b) Convert the hexadecimal number 68BE to binary

**OR**

- 2. a) Express the following function as a sum of minterms and as a product of maxterms:

$$F(A,B,C,D)=B'D+A'D+BD$$

- b) Implement the Boolean function  $F=xy+x'y'+y'z$

- i) With OR and inverter gates    ii) With AND and inverter gates

<b>UNIT-II</b>
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- 3. a) Explain about Exclusive-OR function with an example.
- b) Explain in detail about Don't care conditions with an example.

**OR**

- 4. Explain about the Four-variable map method and simplify the Boolean function

$$F(w,x,y,z)= (0,2,4,5,6,7,8,10,13,15)$$

<b>UNIT-III</b>
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- 5. a) Write down the Analysis procedure of a Combinational circuit.
- b) Explain about Binary Adder with a neat sketch.

**OR**

- 6. a) Explain about Binary Multiplier with a neat sketch.
- b) What is a Multiplexer? Explain how a Boolean function is implemented using Multiplexers.

<b>UNIT-IV</b>
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- 7. a) What is flip – flop and Explain about flip- flops?
- b) Explain about shift registers?

**OR**

- 8. a) Implement JK Flip-Flop with NAND Gate
- b) Compare combinational circuit and sequential circuit

<b>UNIT-V</b>
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- 9. Explain
  - (i) Circuits with latches            (ii) Hazards

**OR**

- 10. Implement the following Boolean function in PAL and PLA

$$F(A,B,C)= (0,1,2,4)$$

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