

(OR)

9. (a) The sequence of numbers 0.63, 0.49, 0.24, 0.57, 0.76, 0.89 have been generated. Use the Kolmogorov-Smirnov test to determine if the hypothesis that the numbers are uniformly distributed in the interval $[0, 1]$. (7M) CO4
- (b) The following is the data related to the profit (in lakhs) of a departmental stores from the year 1999 to 2020. Calculate the four yearly moving averages. (7M) CO4

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Profit	42.5	47.1	50.3	52.9	55.1	57.8	59.3	62.4	65.7	68.7	70.1
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Profit	72.5	74.5	77.7	82.6	85.4	87.6	90.8	91.4	95.2	96.8	97.7

CM/CS/IT211 (R20)

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CM/CS/IT211 (R20)

B.TECH. DEGREE EXAMINATION, JUNE-2023

Semester III [Second Year] (Supplementary)

PROBABILITY AND STATISTICS

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
- (a) Define a discrete random variable. CO1
 - (b) Find the $P(X = 1)$ for a Poisson distribution for which the mean is 2. CO1
 - (c) Define log-normal distribution. CO1
 - (d) What is the mean of Uniform distribution? CO1
 - (e) Define Gamma distribution. CO1
 - (f) Define population and sample. CO2
 - (g) Define level of significance. CO2
 - (h) Define interval estimation. CO2
 - (i) Write about paired t-test. CO3
 - (j) Write the test statistic for one mean in a large sample test. CO3
 - (k) Write the test statistic for two proportions. CO3
 - (l) What is the difference between sign test and Wilcoxon signed rank test? CO4
 - (m) Write the test statistic for U-test. CO4
 - (n) Define a Trend. CO4

UNIT – I

2. (a) A continuous random variable X has a p.d.f $f(x) = 3x^2$, $0 \leq x \leq 1$. Find a and b such that (7M) CO1
- (i) $P(X \leq a) = P(X > a)$
 - (ii) $P(X > b) = 0.05$
- (b) If X is a Poisson variate such that $P(X = 0) = P(X = 2) + 3P(X = 4)$, find (i) the mean of X (ii) $P(X \leq 2)$ (7M) CO1

(OR)

3. (a) In a test on 2000 electric bulbs, it was found that the life of a particular type was normally distributed with an average life of 2040 hours and a standard deviation of 60 hours.

Estimate the number of bulbs likely to burn for

(7M) CO1

- (i) more than 2150 hours
- (ii) less than 1950 hours
- (iii) more than 1920 hours but less than 2160 hours
- (b) In a certain country, the proportion of highway sections requiring repairs in any given year is a random variable having beta distribution with $\alpha = 3$ and $\beta = 2$

(7M) CO1

- (i) On the average what percentage of the highway sections require repairs in any given year?
- (ii) Find the probability that at most half of the highway sections will require repairs in any given year?

UNIT – II

- 4. (a) A population consists of the five numbers 2, 3, 4, 5, 6. Consider all possible samples of size two that can be drawn without replacement from this population. Find

(7M) CO2

- (i) The population mean.
- (ii) The population standard deviation.
- (iii) The mean of the sampling distribution of means.
- (iv) The standard deviation of the sampling distribution of means.

- (b) If a one-gallon can of paint covers on the average 513.3 sq.ft. With a standard deviation of 31.5 sq.ft. What is the probability that the sample mean area covered by a sample of 40 of these one-gallon cans will be anywhere from 510 sq.ft and 520 sq.ft?

(7M) CO2

(OR)

- 5. (a) The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign, the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertisement campaign successful? Test at 1% level of significance
- (b) The following are the number of sales which a sample of 9 sales people of industrial chemicals in California and a sample of 6 sales people of industrial chemicals in Oregon made over a certain fixed period of time?

(7M) CO2

California: 59 68 44 71 63 46 69 54 48

Oregon: 50 36 62 52 70 41

Test the null hypothesis $\mu_x - \mu_y = 0$ against the alternative hypothesis $\mu_x - \mu_y \neq 0$ at 0.01 level of significance.

UNIT – III

- 6. (a) If 12 observations of the specific heat of iron have a standard deviation of 0.0086, test the null hypothesis that $\sigma = 0.01$ for such observations. Use the alternative hypothesis $\sigma \neq 0.01$ and level of significance 0.01.
- (b) Two independent random samples of 8 and 7 items respectively have the following values

(7M) CO3

(7M) CO3

Sample1: 9 11 13 11 15 9 12 14

Sample2: 10 12 10 14 9 8 10

Test whether the difference between the variances is significant at 1% level of significance?

(OR)

- 7. (a) A personal manager claims that 80% of the women employed in the factory quit the job within one year. Test the validity of the statement at 5% level of significance if a sample of 200 women employed last year showed that 152 left the job before completion of the year.
- (b) A study shows that 16 of 200 tractors produced on one assembly line required extensive adjustments before they could be shipped, while the same was true for 14 of 400 tractors produced on another assembly line. At the 0.01 level of significance, does this support the claim that the second production line does superior work?

(7M) CO3

(7M) CO3

UNIT – IV

- 8. (a) The following data gives a random sample of 15 measurements of Octane ratings of certain kind of Gasoline
97.5, 95.2, 97.3, 96, 96.8, 100.3, 97.4, 95.3, 93.2, 99.1, 96.1, 97.6, 98.2, 98.5, 94.9.
Test whether the median is 98.5 or not using Wilcoxon signed rank test.
- (b) The wins and losses are arranged in an order of a football team in the year 2010 and is given below:
WLWWLWLLLWLLWWLWWLWLWLLWLWL

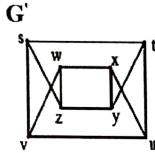
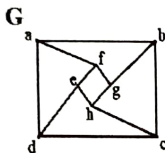
(7M) CO4

(7M) CO4

- (i) Count the number of runs.

- (ii) Test whether the occurrence of losing a match can be considered as random at 5% level of significance.

9. (a) What is meant by Isomorphism? Determine whether the following graphs G and G' are isomorphic or not. (7M) CO4



- (b) Prove that every chain is a distributive lattice. (7M) CO4

CD/CM/CO/CS/IT212 (R20)

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CD/CM/CO/CS/IT212 (R20)

B.TECH. DEGREE EXAMINATION, JUNE-2023

Semester III [Second Year] (Supplementary)

DISCRETE MATHEMATICS

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- (a) Define Contradiction. Give suitable example. CO1
- (b) Define Modus Ponens. CO1
- (c) Define Venn diagram with the help of an example. CO1
- (d) Define Sum rule of counting. CO2
- (e) Find the number of permutations of the word MISSISSIPPI. CO2
- (f) Solve $C(12, 6)$. CO2
- (g) What is the recurrence relation for 1, 7, 31, 127 and 499? CO3
- (h) Define recursive algorithm. CO3
- (i) Consider the recurrence relation $a_1 = 4$, $a_n = 5n + a_{n-1}$. Find the value of a_{64} . CO3
- (j) Find the value of a_4 for the recurrence relation $a_n = 2a_{n-1} + 3$, with $a_0 = 6$. CO4
- (k) Define simple graph. CO4
- (l) Define POSET and give an example. CO4
- (m) Define Hamiltonian circuit. CO4
- (n) Define four colour problem. CO4

UNIT – I

2. (a) Construct the truth table of $[(p \rightarrow q) \wedge (r \rightarrow s) \wedge (p \vee r)] \rightarrow (q \vee s)$. Make a truth table for the propositional form $(P \wedge \sim Q) \rightarrow (P \vee Q)$, and then find a simpler expression which is logically equivalent to it. (7M) CO1

- (b) If an integer 'a' such that $a - 2$ is divisible by 3 then $a^2 - 1$ is divisible by 3. Give a direct proof for the above sentence.

(7M) CO1

(OR)

3. (a) Prove by Mathematical Induction, for any natural number n , $x^n - y^n$ is divisible by $x - y$, where x and y are any integers with $x \neq y$. (7M) CO1
- (b) Prove or disprove the validity of the following argument using Rules of Inference (7M) CO1
- If a baby is hungry, then the baby cries.
 If a baby is not mad, then he does not cry.
 If a baby is mad, then he has a red face.
 Therefore, if a baby is hungry, then he has a red face.

UNIT – II

4. (a) How many integral solutions are there to the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 50$ where each box is non empty? (7M) CO2
- (b) There are 30 females and 35 males in the junior class while there are 25 females and 20 males in the senior class. In how many ways can a committee of 10 be chosen so that there are exactly 5 females and 3 juniors on the committee? (7M) CO2

(OR)

5. (a) How many three digit numbers are there which are even and have no repeated digits. (7M) CO2
- (b) A number of 4 different digits is formed by using the digits 1, 2, 3, 4, 5, 6, 7 in all possible ways. (7M) CO2
- (i) How many such numbers can be formed?
- (ii) How many of them are greater than 3400?
- (iii) How many of them are divisible by 2?
- (iv) How many of them are divisible by 4?

UNIT – III

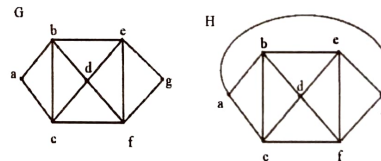
6. (a) Evaluate the coefficient of x^{15} in $(x^2 + x^3 + x^4 + x^5)(x + x^2 + \dots + x^7)$ (7M) CO3
- (b) Evaluate the coefficient of x^{12} in $(1 - x^4 - x^7 + x^{11}) \frac{1}{(1-x)^5}$ (7M) CO3

(OR)

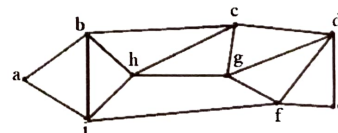
7. (a) Solve $a_n - 6a_{n-1} + 11a_{n-2} - 6a_{n-3} = 0$, where $a_0 = 2$, $a_1 = 0$, $a_2 = -2$. (Use Characteristics roots method) (7M) CO3
- (b) Solve $a_n - 9a_{n-1} + 20a_{n-2} = 0$, where $a_0 = -3$, $a_1 = -10$ using generating function method. (7M) CO3

UNIT – IV

8. (a) Find the chromatic number of the graphs G and H shown below? (7M) CO4



- (b) Determine whether the following graph has Euler circuit. (7M) CO4



(OR)

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CD/CM/CS/IT213 (R20)

B.TECH. DEGREE EXAMINATION, JUNE-2023

Semester III [Second Year] (Supplementary)

COMPUTER ORGANIZATION

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- (a) What do you mean by instruction level parallelism? CO1
- (b) Summarize the operation of a computer. CO1
- (c) Define stack. CO2
- (d) Illustrate the use of subroutines in program development. CO2
- (e) Analyze the steps needed to execute the following arithmetic instruction. **Add R3, R4, R5** CO2
- (f) Define pipeline hazard. CO3
- (g) Distinguish between static branch prediction and dynamic branch prediction in a pipelined execution. CO3
- (h) Define Interrupt and ISR. CO4
- (i) What is and interrupt latency? CO4
- (j) SCSI bus may be used to connect a variety of devices to a computer – Justify. CO4
- (k) Define RAM and ROM. CO5
- (l) Compare the features of static RAM and dynamic RAM. CO5
- (m) Apply booth multiplication by recoding multiplier on the following signed numbers and give the result.
+13 and -6. CO6
- (n) Define overflow. CO6

UNIT – I

2. (a) (i) Elaborate the steps needed to execute the machine instruction **Load R2, LOC** in terms of transfers between the components of processor and memory.
 (ii) Convert the following pairs of decimal numbers to 5-bit 2's complement numbers and then perform addition and subtraction on each pair. Indicate whether or not overflow occurs for each case.
 (a) 7 and 13
 (b) -12 and 9
 (7M) CO1
- (b) Explain with neat diagram basic functional units of a computer. (7M) CO1

(OR)

3. (a) What do you mean by instruction execution and straight line sequencing? Explain. (7M) CO1
- (b) Discuss with suitable instructions logical, shift and Rotate instructions. (7M) CO1

UNIT – II

4. (a) With neat diagram explain about hardwired control unit. (7M) CO2
- (b) Discuss the following instructions with suitable examples. (7M) CO2
 - (i) Load instructions
 - (ii) Arithmetic and Logic instructions
 - (iii) Store instructions

(OR)

5. (a) Discuss the methods used to handle data dependencies in pipelined execution. (7M) CO2
- (b) How to handle branch delays in pipelined execution? Discuss. (7M) CO2

UNIT – III

6. (a) Illustrate with suitable example usage of interrupts in I/O transfers. (7M) CO4
- (b) How to handle interrupt requests from multiple devices in interrupt execution? Explain. (7M) CO4

(OR)

7. (a) How to control the data transfer on a bus using handshaking protocol? Explain. (7M) CO3
- (b) Discuss in detail interconnection standard PCI bus with neat diagrams. (7M) CO3

UNIT – IV

8. (a) What are variants of ROM? Write notes on each. (7M) CO5
- (b) Discuss about various cache memory mapping functions. (7M) CO5

(OR)

9. (a) Discuss in detail Booth's algorithm to perform multiplication on signed operands along with suitable example. (7M) CO6
- (b) Discuss in detail design of fast adders. (7M) CO6

CD/CM/CS/IT213 (R20)

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CM214 (R20)

B.TECH. DEGREE EXAMINATION, JUNE-2023

Semester III [Second Year] (Supplementary)

DATABASE MANAGEMENT SYSTEMS

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- | | |
|--|-----|
| (a) Explain database languages. | CO1 |
| (b) What are the roles of DBA? | CO1 |
| (c) Define foreign key. | CO1 |
| (d) Explain schema refinement. | CO2 |
| (e) Outline the syntax for creating table in SQL. | CO2 |
| (f) What is the basic form of SQL query? | CO2 |
| (g) Define entity set and relationship set. | CO3 |
| (h) Explain the concept of ternary relationship. | CO3 |
| (i) What are the properties of decomposition? | CO3 |
| (j) What are the reasons for transaction to become incomplete? | CO4 |
| (k) What is database consistency? | CO4 |
| (l) What are the problems caused by redundancy? | CO4 |
| (m) What is the need to have the concept recovery in DBMS? | CO4 |
| (n) Explain about transaction states. | CO4 |

UNIT – I

2. (a) What are the applications of DBMS? (7M) CO1
- (b) Explain various types of database users in DBMS. (7M) CO1

(OR)

3. (a) Explain about transaction management. (7M) CO1
 (b) Discuss about the various types of relational operations with examples. (7M) CO1

UNIT – II

4. (a) What are various logical connectivities in SQL? Write example queries for each. (7M) CO2
 (b) Discuss about nested queries by illustrating with examples. (7M) CO2

(OR)

5. (a) What aggregate operators does SQL support? Explain with examples. (7M) CO2
 (b) Analyse the following schemas
 Sailors(sid, sname, rating, age)
 Reserves (sid, bid, day)
 Boats (bid, bname, color)
 Write the following queries in relational algebra. (7M) CO2
 (i) Find the age of sailors who have reserved boat 105.
 (ii) Find the names and ages of sailors with a rating above 7.
 (iii) Find the names of sailors who have reserved a red boat.
 (iv) Find the sname, bid and day for each reservation.
 (v) Find the names of sailors who have reserved at least one boat.

UNIT – III

6. (a) Explain how an ER model is converted into a relational model. (7M) CO3
 (b) Illustrate about 4NF with a suitable example. (7M) CO3

(OR)

7. (a) Explain 3NF and BCNF. What is the difference between them? (7M) CO3
 (b) Discuss about functional dependencies. (7M) CO3

UNIT – IV

8. (a) What is meant by transaction serializability? Explain with an example. (7M) CO4
 (b) Explain about buffer management. (7M) CO4

(OR)

9. (a) Discuss about Multiple Granularity Locking. (7M) CO4
 (b) Explain about various properties of transaction. (7M) CO4

CM214 (R20)

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CD/CM/CO/CS/IT215 (R20)

B.TECH. DEGREE EXAMINATION, JUNE-2023

Semester III [Second Year] (Supplementary)

OBJECT ORIENTED PROGRAMMING

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- (a) What is a JVM? CO1
- (b) Distinguish between method overloading and method overriding. CO2
- (c) What is the difference between thread and process? CO5
- (d) What is the use scanner class? CO2
- (e) Distinguish between checked exceptions and unchecked exceptions. CO4
- (f) Define object cloning? CO1
- (g) Define event? CO6
- (h) Distinguish between final and abstract modifier. CO2
- (i) Distinguish between String and StringBuffer class. CO3
- (j) What is the use of import in package? CO3
- (k) Describe any two listener classes? CO6
- (l) Describe any four built-in exception classes? CO4
- (m) Write the difference between Swing components and AWT Components. CO6
- (n) Distinguish between remote applet and local applet. CO6

UNIT – I

- 2. (a) Explain different types of constructors in Java using shape geometrical class. (7M) CO1
- (b) Discuss in detail Java programming features. (7M) CO1

(OR)

3. (a) Explain garbage collection with help of finalize() method. (7M) CO1
(b) Develop a Boolean static method in Java "the given number is strong or not". And also write the corresponding input and output program code. (7M) CO1

UNIT – II

4. (a) Distinguish between usage of 'this' and 'super' keyword with suitable example Java programs. (7M) CO2
(b) Develop a Java program that 'have two interfaces: Motorbike and Cycle. Motorbike interface consists of the attribute speed and the method is totalDistance(). Cycle interface consists of the attribute distance and the method speed(). Both these interfaces are implement by the class TwoWheeler'. (7M) CO3

(OR)

5. (a) What is a dynamic method dispatching? Discuss method overriding example. (7M) CO2
(b) Write a Java program to check the string is palindrome or not using string buffer class instance. (7M) CO2

UNIT – III

6. (a) Explain life cycle methods of thread with neat diagram. (7M) CO5
(b) Explain MouseListener methods with suitable examples. (7M) CO6

(OR)

7. (a) Discuss the steps to create the user defined exception classes with suitable example. (7M) CO4
(b) Distinguish between an Applet and a Java application explain in detail? (7M) CO3

UNIT – IV

8. (a) Discuss any five AWT components with suitable examples. (7M) CO6
(b) What is a Generic Class? Explain different generic framework classes with suitable examples. (7M) CO6

(OR)

9. (a) Describe and discuss the different Java LayoutManagers. (7M) CO6
(b) Develop a Java program to validate the username and password using swing components. (7M) CO6

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