

7. Tests of fidelity and the selectivity of 190 digital radio receivers produced the results shown in the following table. CO3

Fidelity				
	Low	Average	High	
Selectivity	Low	6	12	32
	Average	33	61	18
	High	13	15	0

Use the 0.01 level of significance to test whether there is a relationship between fidelity and selectivity.

UNIT – IV

8. (a) Use the sign test at 0.05 level of significance to test the null hypothesis $\mu = 0.55$ against the alternative hypothesis $\mu \neq 0.55$. Given that a random sample of 15 measurements of the octane rating of a certain kind of gasoline;

99	102.3	99.8	100.5	99.7	96.2	99.1	102.5
103.3	97.4	100.4	98.9	98.3	98	101.6	

(7M) CO4

- (b) The following is the arrangement of defective, d, and non defective, n pieces produced in the given order by a certain machine. Test for randomness at the 0.01 level of significance.

nnnnn dddd nnnnnnnnnn dd nn dddd (7M) CO4

(OR)

9. The following data represents the weight in Kgs of a personal luggage carried in an aircraft by the members of two baseball clubs

CO4

Club A	34	39	41	28	33	
Club B	36	40	35	31	39	

Use U-test to test the hypothesis that the two clubs carry same amount of luggage at 0.05 level of significance.

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B. TECH. DEGREE EXAMINATION, APRIL-2022

Semester III [Second Year] (Regular)

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) Three light bulbs are chosen at random from 12 bulbs of which 5 are defective. Write the probability that all are defective.

CO1

- (b) If the pdf of a random variable is given by

$$f(x) = \begin{cases} k(1-x^2), & \text{if } 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

Find k.

CO1

- (c) If for a poisson variate $2P(X=0) = P(X=2)$. Find the probability that $P(X \leq 3)$.

CO1

- (d) Write the density function of Weibull distribution.

CO1

- (e) Find the value of the finite population correction factor for $n=10$, $N=1000$

CO2

- (f) Define null hypothesis.

CO2

- (g) If the sample size is small write the confidence limits for single mean.

CO2

- (h) Define random sampling.

CO2

- (i) Write the test statistic for single variance.

CO3

- (j) Write the maximum error estimate for the proportion P.

CO3

- (k) Write the critical region for testing of hypothesis concerning two means in two tail test.

CO3

- (l) Write the test statistic for sign test.

CO4

- (m) Write the test statistic for test for randomness.

CO4

- (n) Define trend.

CO4

UNIT – I

2. (a) Two dice are thrown x assign to each point of S , the sum of the numbers on two faces. Find the mean and variance of the random variable x . (7M) CO1
- (b) The manufacture of large high-definition LCD panels is difficult, and a moderately high proportion have too many defective pixels to pass inspection. If the probability is 0.3 that an LCD panel will not pass inspection, what is the probability that 6 of 18 panels, randomly selected from production, will not pass inspection. (7M) CO1

(OR)

3. (a) In a normal distribution, 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution. (7M) CO1
- (b) Find the mean and variance of the uniform distribution with the parameters α and β . (7M) CO1

UNIT – II

4. (a) A population consists of size five numbers 2, 3, 6, 8, 11. Consider all possible samples of size 2 that can be drawn with replacement from this population. Find: (7M) CO2
 - (i) The mean of the population
 - (ii) The standard deviation of the population
 - (iii) The mean of the sampling distribution of means.
 - (iv) The standard deviation of the sampling distribution of means.
- (b) What is the effect of standard error, if a sample is taken from an infinite population of sample size is increased from 400 to 900. (7M) CO2

(OR)

5. (a) A trucking firm is suspicious of the claim that the average lifetime of certain tires is at least 28,000 miles. To check the claim, the firm puts 40 of these tires on its trucks and gets a mean lifetime of 27,463 miles with a standard deviation of 1,348 miles. What can it conclude if the probability of Type I error is to be at most 0.01? (7M) CO2
- (b) A random sample of size 100 is taken from an infinite population having the mean $\mu = 76$ and variance $\sigma^2 = 256$. What is the probability that \bar{x} will be between 75 and 78. (7M) CO2

UNIT – III

6. (a) Transceivers provide wireless communication among electronic components of consumer products. Responding to a need for a fast, low-cost test of Bluetooth-capable transceivers, engineers developed a product test at the wafer level. In one set of trials with 60 devices selected from different wafer lots, 48 devices passed. Test the null hypothesis $p = 0.7$ against the alternative hypothesis $p > 0.7$ at the 0.05 level of significance. (7M) CO3
- (b) It is desired to determine whether there is less variability in the silver plating done by Company 1 than in that done by Company 2. If independent random samples of sizes 40, 30 of the two companies work yield $s_1 = 15.2mil$ and $s_2 = 18.7mil$, test the null hypothesis $\sigma_1^2 = \sigma_2^2$ against the alternative hypothesis $\sigma_1^2 < \sigma_2^2$ at the 0.05 level of significance. (7M) CO3

(OR)

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B. TECH. DEGREE EXAMINATION, APRIL-2022

Semester III [Second Year] (Regular)

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) Explain converse, inverse and contra positive of conditional statement $A \rightarrow B$ CO1
- (b) Define an inverse function with a suitable example. CO1
- (c) State types of quantifiers. CO1
- (d) Explain sum rule in elementary combinatorics. CO2
- (e) Differentiate permutation and combination with an example. CO2
- (f) There are 15 married couples in a party. In how many ways we can select a man and a woman so that they are married to each other. CO2
- (g) Define recurrence relation. CO3
- (h) Find the first four terms of sequence $a_n = 2a_{n-1} + n$ $n \geq 2, a_1 = 1$ CO3
- (i) Solve the recurrence relation $a_n - 3a_{n-1} = 0$ CO3
- (j) Define partial order relation. CO4
- (k) Give an example of a relation which is both symmetric and anti symmetric. CO4
- (l) Define Planar graph. CO4
- (m) Define lattice. CO4
- (n) Explain chromatic number. CO4

UNIT - I

2. (a) Show the following equivalencies without using truth tables

$$\neg(P \wedge Q) \rightarrow (\neg P \vee (\neg P \vee Q)) \Leftrightarrow (P \rightarrow Q) \quad (7M) \quad CO1$$

- (b) Express $P \rightarrow (\neg P \rightarrow Q)$ in terms of \uparrow (NAND) only. Express the same formula in terms of \downarrow (NOR) only.

(7M) CO1

(OR)

3. (a) Show that $(\forall x)(p(x) \vee q(x)) \Rightarrow (\forall x)p(x) \vee (\exists x)q(x)$
 (b) Show that $r \wedge (p \vee q)$ is a valid conclusion from the premises $p \vee q, q \rightarrow r, p \rightarrow m$ and $\neg m$.

(7M) CO1

(7M) CO1

UNIT – II

4. (a) Find the number of numbers between 1 and 500 (both inclusive) which are divisible by 3 or 5 or 7. How many of them are divisible by 3 or 7 but not by 5.

(7M) CO2

- (b) How many solutions does the equation $x_1 + x_2 + x_3 = 20$ have, where x_1, x_2, x_3 are non negative integers?

(7M) CO2

(OR)

5. (a) In how many ways can a prize winner chose three CDs from the top ten if repetitions are allowed.

(7M) CO2

- (b) How many integral solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 30$ where each $x_i \geq i$.

(7M) CO2

UNIT – III

6. (a) Find the solution for the following equation by the method of characteristic roots.

$$a_n - 4a_{n-1} - 12a_{n-2} = 0, \quad n \geq 2, \quad a_0 = 4; a_1 = \frac{16}{3}$$

(7M) CO3

- (b) Solve using generating functions the recurrence relation

$$a_n - 7a_{n-1} + 12 = 0 \text{ for } n \geq 2, a_0 = 1, a_1 = 4$$

(7M) CO3

(OR)

7. (a) Find the coefficient of x^{12} in $(x^2 + x^3 + x^4 + x^5)(x^1 + x^2 + \dots + x^7)(1 + x + \dots + x^{15})$ (7M) CO3
 (b) Find the coefficient of X^{23} in $(1 + X^5 + X^9)^{10}$ (7M) CO3

UNIT – IV

8. (a) In every graph, show that (i) the sum of degrees of all the vertices is twice the number of edges.
 (ii) The number of vertices of odd degree is even. (7M) CO4
 (b) Define planar and non-planar graphs. Draw the bipartite graph $K_{3,3}$ and find its chromatic number. (7M) CO4

(OR)

9. (a) Prove that in a lattice (L, \leq) , $a \leq b$ if and only if $a \wedge b = a$. (7M) CO4
 (b) If R is a Relation in the set of integers Z defined by $R = \{(x, y) / x \text{ and } y \text{ are integers and } (x - y) \text{ is divisible by } 6\}$ then prove that R is an equivalence relation. (7M) CO4

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CS/IT213(R20)

B. TECH. DEGREE EXAMINATION, APRIL-2022

Semester III [Second Year] (Regular)

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)

I. Answer the following:

- (a) Which type instruction is used for relative addressing mode?
CO1
- (b) What is the characteristic of RAM memory makes it as not suitable for permanent storage?
CO1
- (c) How machine instructions are encoded in a processor?
CO1
- (d) What are the hardware components?
CO2
- (e) What are six fundamental phases of the instruction cycle?
CO2
- (f) The pipelining process is also called as ___ and why?
CO2
- (g) To increase the speed of memory access in pipelining, what we make use?
CO3
- (h) The SCSI BUS is used to connect the video devices to a processor by providing a _____.
CO3
- (i) The usual BUS structure used to connect the I/O device is _____.
CO3
- (j) What are the key features of the PCI BUS?
CO4
- (k) Write about Read Only Memory?
CO4
- (l) The DMA transfers are performed by a control circuit called as?
CO4
- (m) Which type of chip is used to implement cache memory?
CO4
- (n) Whenever the data is found in the cache memory it is called as?
CO4

UNIT – I

2. (a) What are different types of computers? Explain. (7M) CO1
- (b) Write about functional units of a computer. (7M) CO1

(OR)

3. (a) Briefly explain about any four addressing modes with examples. (7M) CO1
- (b) Briefly explain about encoding of machine instructions? (7M) CO1

UNIT – II

4. (a) Write about instruction cycle with neat diagram. (7M) CO2
- (b) Write about control signals and Hardware control unit. (7M) CO2

(OR)

5. (a) What is instruction pipelining? What are the conflicts that occurred during instruction Pipelining? (7M) CO2
- (b) Write about pipelining and its importance in high speed applications. (7M) CO2

UNIT – III

6. (a) Briefly explain about Peripheral Devices. (7M) CO3
- (b) Write about enabling and disabling an interrupt. (7M) CO3

(OR)

7. (a) With practical examples, Explain the connection of I/O bus to input-output devices and its mapping specifications. (7M) CO3
- (b) Explain in detail about strobe control method of asynchronous data transfer. (7M) CO3

UNIT – IV

8. (a) Explain the mechanism involved in Magnetic Disks and Magnetic Tapes. (7M) CO4
- (b) With a neat schematic diagram, explain about DMA controller and its mode of data transfer. (7M) CO4

(OR)

9. (a) Implement hardware for multiplying two fixed-point binary numbers in signed-magnitude representation along with its flowchart. (7M) CO4
- (b) Explain the process for signed magnitude addition and subtraction with flowchart. (7M) CO4

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CS/IT214(R20)

B. TECH. DEGREE EXAMINATION, APRIL-2022

Semester III [Second Year] (Regular)

DATA STRUCTURES

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 Data Abstraction? CO1
- (b) Define Time complexity. CO1
- (c) List various Asymptotic notations. CO1
- (d) Write the advantages and disadvantages of double linked lists. CO2
- (e) Define Hashing. CO2
- (f) Define Overflow. CO2
- (g) Define stack with an example. CO3
- (h) What is Linked list? CO3
- (i) Define Queue ADT. CO3
- (j) What is the role of balance factor in AVL Tree? CO4
- (k) Define Heap. CO4
- (l) List the properties of Trees. CO4
- (m) What is Binary Search Tree? CO4
- (n) Define full binary tree. CO4

UNIT - I

- 2. (a) Illustrate iterative algorithm for finding the reverse of a given string and analyse space and time complexities. (7M) CO1
- (b) Write a recursive algorithm to find the sum of first n integers and Derive its time complexity. (7M) CO1

(OR)

3. (a) Define binary search and explain the working principle with an example. (7M) CO1
- (b) Discuss insertion sort algorithm and trace the steps of insertion sort for sorting the list 12, 19, 33, 26, 29, 35, 22, 37. Find the total number of comparisons made. (7M) CO1

UNIT – II

4. (a) Illustrate an algorithm to insert new node at the beginning, at middle position and at the end of a singly linked list. (7M) CO2
- (b) Write an algorithm for polynomial addition using linked list. (7M) CO2

(OR)

5. (a) Define hashing and explain hash tables in detail. (7M) CO2
- (b) Explain the different collision resolution strategies for hashing. State the advantages and disadvantages of each technique. (7M) CO2

UNIT – III

6. (a) Explain the procedure to evaluate postfix expression. Evaluate the following postfix expression $7\ 3\ 4\ +\ -\ 2\ 4\ 5\ /\ +\ *6\ /\ +$. (7M) CO3
- (b) Write an algorithm for basic operations of stack. (7M) CO3

(OR)

7. (a) Explain basic operations of queue. List the steps to implement queue using linked list. (7M) CO3
- (b) Discuss various applications of queues. (7M) CO3

UNIT – IV

8. (a) What is an AVL search tree? How do we define the height of it? Explain balance factor associated with a node of an AVL tree. (7M) CO4
- (b) Insert the following sequence of elements into an AVL tree, starting with an empty tree: 10, 20, 15, 25, 30, 16, 18, 19. (7M) CO4

(OR)

9. (a) What operations can be performed on binary trees? Discuss. (7M) CO4
- (b) Write in-order, pre-order and post-order traversal of a binary tree. (7M) CO4

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CS/IT215(R20)

B. TECH. DEGREE EXAMINATION, APRIL-2022

Semester III [Second Year] (Regular)

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)

I. Answer the following:

- (a) Define constructor. CO1
- (b) Explain about this keyword. CO1
- (c) List the methods of Date class. CO1
- (d) What are Access Specifiers available in Java? CO2
- (e) Explain the usage of super keyword. CO2
- (f) Write the syntax for creation and import a sub package. CO2
- (g) Write short note on 'throws'. CO3
- (h) Explain final keyword. CO3
- (i) Write brief notes on thread priorities. CO3
- (j) Define Frame. CO4
- (k) What is Container? CO4
- (l) List the methods of CheckBox. CO4
- (m) Illustrate collection classes. CO4
- (n) List the layout managers. CO4

UNIT – I

- 2. (a) Explain about benefits and applications of OOPs. (7M) CO1
- (b) Explain about operators in Java with example program. (7M) CO1

(OR)

3. (a) Write about automatic type conversion and explain when casting is needed with an example program. (7M) CO1
(b) Explain about Java buzzwords. (7M) CO1

UNIT – II

4. (a) Discuss about different forms of inheritance with an example program. (7M) CO2
(b) Why multiple inheritance is not available in JAVA and explain how to implement it? (7M) CO2

(OR)

5. (a) Define package. Explain how to import package in JAVA. (7M) CO2
(b) Explain about Wrapper classes in JAVA with an example program. (7M) CO2

UNIT – III

6. (a) Discuss how mouse and keyboard events can be handled. (7M) CO3
(b) Explain passing parameters to applet with example. (7M) CO3

(OR)

7. (a) Describe event classes and sources of events. (7M) CO3
(b) Explain different types of exception with examples. (7M) CO3

UNIT – IV

8. (a) Explain about JApplet and JComponent. (7M) CO4
(b) Explain about generic methods and generic (7M) CO4

classes.

(OR)

9. (a) Describe AWT control fundamentals in detail. (7M) CO4
(b) Explain about collection classes and interfaces. (7M) CO4

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