(OR)

7. The following is the distribution of the hourly number of trucks arriving at a company's warehouse:

Trucks arriving per hour	0	1	2	3	4	5	6	7	8
Frequency	52	151	130	102	45	12	5	1	2

Find the mean of the distribution and using it as a parameter λ, fit a Poisson distribution. Test for goodness of fit at the 0.05 level of significance. CO3

UNIT – IV

8 (a) The following are the self-reported times (hours for month), spent on homework, by random samples of juniors in two different majors.

Major 1	63	72	29	58	81	65	79	57	40	76	47	55	60
Major 2	41	32	26	43	78	49	39	56	15	54	8	66	64

Use the U test at the 0.05 level of significance to test whether or not students from the 2 groups devote the same amounts of time to homework. (7M) CO4

(b) The following are the number of defective pieces turned out by a machine during 24 consecutive shifts: 15, 11, 17, 14, 16, 12, 19, 17, 21, 15, 17, 19, 21, 14, 22, 16, 19, 12, 16, 14, 18, 17, 24, 13. Test for randomness at the 0.01 level of significance. (7M) CO4

(OR)

9. The breaking strength (in pounds) of a random sample of 10 ropes made by a manufacturer is given by 163, 165, 165, 160, 171, 158, 151, 162, 169, 172. Use the sign test to test the manufacture's claim that the average breaking strength of a rope is greater than 160 pounds at 5% level of significance. CO4

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CS/IT211(R20)

Hall Ticket Number:

CS/IT211(R20)

B.TECH. DEGREE EXAMINATION, AUGUST-2022

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) Write the probability of getting one red king if we select a card from a pack of 52 cards. CO1
   (b) A die is thrown 8 times. If getting a 2 or 4 is a success. Find the probability of 4 success. CO1
   (c) Find the mean and variance of the uniform distribution. CO1
   (d) Write any two properties of normal distribution. CO1
   (e) How many different samples of size 2 can be chosen, from a finite population of size 25? CO2
   (f) Define critical region. CO2
   (g) If the sample size is large, write the confidence limits for single mean. CO2
   (h) Define purposive sampling. CO2
   (i) Write the test statistic for single proportion. CO3
   (j) Write about F-test. CO3
   (k) Write the critical region for testing of hypothesis concerning two variances in two tail test. CO3
   (l) Write the test statistic for U test. CO4
   (m) What is the advantage of nonparametric tests? CO4
   (n) Define time series. CO4

UNIT – I

2. (a) If the probability density of a random variable is

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

Find: (*i*) k (*ii*) $P(0.1\le X\le 0.2)$ (*iii*) $P(X\ge 0.5)$ (7M) CO1

(b) Find the probability that by guess-work a student can correctly answer 25 of 30 questions in a multiple-choice quiz consisting of 80 questions. Assume that in each question with four choices, only one choice is correct and student has no knowledge of the subject. (7M) CO1

(OR)

3. (a) If X is a normal variate with mean 30 and standard deviation 60. Find the probabilities that $(i)\ 26 \le X \le 40$ $(ii)\ X \ge 45$ (7M) CO1

(b) In a certain country, the proportion of highway sections requiring repairs in any given year is a random variable having the beta distribution with $\alpha = 3$, $\beta = 2$. (7M) CO1

(i) On the average, what percentage of the high way 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 size six numbers 1, 2, 3, 4, 5, 6. Consider all possible samples of size 2 that can be drawn without 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) It is desired to estimate the mean time of continuous use until an answering machine will first require service. If it can be assumed that $\sigma = 60$ days, how large a sample is needed so that one will be able to assert with 90% confidence that the sample mean is off by at most 10 days. (7M) CO2

(OR)

5. (a) The mean weight loss of n = 16 grinding balls after a certain length of time in mill slurry is 3.42 grams with a standard deviation of 0.68 grams. Construct 99% confidence interval for the true mean weight loss of such grinding balls under the stated conditions. (7M) CO2

(b) The dynamic modulus of concrete is obtained for two different concrete mixes. For the first mix, $n_1 = 33$, $\bar{x} = 115.1$, $s_1 = 0.47\,psi$ For the second mix $n_2 = 31$, $\bar{y} = 114.6$, $s_2 = 0.38\,psi$. Test, with $\alpha = 0.05$, the null hypothesis of equality of mean dynamic modulus versus the two-sided alternative. (7M) CO2

UNIT – III

6. (a) A lapping process which is used to grind certain silicon wafers to the proper thickness. Is acceptable only if σ, the population standard deviation of the thickness of dice cut from the wafers, is at most 0.5 mil. Use the 0.05 level of significance to test the null hypothesis $\sigma = 0.5$ against the alternative hypothesis $\sigma > 0.5$, if the thickness of 15dice cut from such wafers have a standard deviation of 0.64 mil. (7M) CO3

(b) A study showed that 64 of 180 persons who saw a photocopying machine advertised during the telecast of a base ball game and 75 of 180 other persons who saw it advertised on a variety show, remembered the brand name 2 hours later. Test whether the difference between the corresponding sample proportions is significant at the 0.05 level of significance. (7M) CO3

Hall Ticket Number:

CS/IT212(R20)

B.TECH. DEGREE EXAMINATION, AUGUST-2022

Semester III [Second Year] (Supplementary)

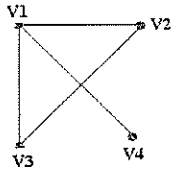
DISCRETE MATHEMATICS

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) Using the statements:
   R: John is Healthy H: John is clever
   Write the following statements in symbolic form CO1
   (i) If John is healthy then he is not clever
   (ii) John is not healthy but clever.
   (b) Show that $(x)(H(x) \rightarrow M(x)) \wedge H(s) \Rightarrow M(s)$. CO1
   (c) If the universe of the discourse is the set $\{a,b,c\}$ eliminate the quantifier from $(x)R(x)$ CO1
   (d) Explain product rule in elementary combinatorics. CO2
   (e) Explain principle of inclusion and exclusion. CO2
   (f) Compute the number of subcommittees of three members each that can be formed from a committee of 25 members. CO2
   (g) Write general form of second order linear homogeneous recurrence relation. CO3
   (h) Determine the coefficient of x^{12} in $x^3(1-2x)^{10}$. CO3
   (i) Find a generating function for a_r = the number of nonnegative integral solutions of $e_1 + e_2 + \cdots + e_n = r$ where $0 \leq e_i \leq 1$. CO3
   (j) Write Euler's formula for plane graph. CO4

(k) Find adjacency matrix for the following graph CO4



(l) Give an example of a relation which is both symmetric and anti symmetric. CO4

(m) Define Isomorphism of two graphs. CO4

(n) Describe the problem of Konigsberg Seven bridges. CO4

UNIT – I

2. (a) Show that $((P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee \neg R))) \vee (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R)$ is a tautology. (7M) CO1

(b) Prove that $\neg(p \rightleftarrows q) \Leftrightarrow (p \vee q) \wedge \neg(p \wedge q)$ (7M) CO1

(OR)

3. (a) Show that $(\forall x)(p(x) \vee q(x)) \Rightarrow (\forall x)p(x) \vee (\exists x)\, q(x)$ (7M) CO1

(b) Derive the following $P, P \rightarrow (Q \rightarrow (R \wedge S)) \Rightarrow Q \rightarrow S$ (7M) CO1

UNIT – II

4. (a) How many non-negative integral solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where $x_1 \leq 3,\ x_2 \leq 2,\ x_3 \leq 4,\ x_4 \leq 6,\ x_5 \leq 0$ (7M) CO2

(b) Compute the number of integers between 1 and 1000 that are not divisible by 2, 3, 5 or 7. (7M) CO2

(OR)

5. (a) In how many ways can 12 balloons be distributed at a birth day party among 10 children. (7M) CO2

(b) Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed. (7M) CO2

UNIT – III

6. (a) Solve the recurrence relation $a_n - 7a_{n-1} + 16a_{n-2} - 12a_{n-3} = 0$ for $n \geq 3$ with the initial conditions $a_0 = 1, a_1 = 4$ and $a_2 = 8$. (7M) CO3

(b) Express $\frac{1}{6 - 5X + X^2}$ as formal power series. (7M) CO3

(OR)

7. (a) Find the coefficient of X^{15} in $A(X) = (X^2 + X^3 + X^4 + X^5)\ (1 + X + \ldots + X^{15})$ (7M) CO3

(b) Find the coefficient of X^{20} in $(X^3 + X^4 + X^5 \ldots)^5$. (7M) CO3

UNIT – IV

8. (a) If $G=(V,E)$ is a connected plane graph, show that $|V| - |E| + |R| = 2$. (7M) CO4

(b) Draw the bipartite graph $k_{3,3}$ and find its chromatic number. (7M) CO4

(OR)

9. (a) In a lattice $(L, \leq)$, for any $a, b, c \in L$, prove that $b \leq c \Rightarrow a \vee b \leq a \vee c$ and $a \wedge b \leq a \wedge c$ (7M) CO4

(b) Let A be a given finite set and P(A) its power set. Let $\subseteq$ be the inclusion relation on the elements of P(A). Draw a Hasse diagram of $(P(A), \subseteq)$ for A = {a, b, c} (7M) CO4

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Hall Ticket Number:

CS/IT213(R20)

B.TECH. DEGREE EXAMINATION, AUGUST-2022

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) Write the basic performance equation. CO1
   (b) Define the term Computer Architecture. CO1
   (c) Define Program counter. CO2
   (d) Define instruction pipeline. CO3
   (e) What are the types of pipeline hazards? CO3
   (f) What are the steps required for a pipelined processor to process the instruction? CO3
   (g) Define – Superscalar Processor. CO3
   (h) What is an I/O Interface? CO4
   (i) How to handle multiple devices? CO4
   (j) Write the factors considered in designing an I/O subsystem. CO4
   (k) Define Hit and Miss. CO5
   (l) Define DMA controller. CO5
   (m) Write the Add/subtract rule for floating point numbers. CO6
   (n) In floating point numbers when so you say that an underflow or overflow has occurred. CO6

UNIT – I

2. (a) Draw the connection between processor and memory and mention the functions of each component in the connection. (7M) CO1

(b) Perform the arithmetic operation in binary using 2`s complement representation
(i). (+42) + (–13) (ii) (–42) – (–13). (7M) CO1

(OR)

3. (a) With a neat schematic, explain the steps involved in fetch and decode phases using register transfer instructions. (7M) CO1
(b) Elaborate the steps involved in execution of Memory-Reference instructions with its Timing signals. (7M) CO1

UNIT – II

4. (a) Write about hardware components of computer. (7M) CO2
(b) Consider a processor is having single bus organization of the datapath inside a processor. Write the sequence of control steps required for each of the following instructions: (7M) CO2
(i) Add the (immediate) number NUM to register R1.
(ii) Add the contents of memory location NUM to register R1.
(iii) Add the contents of the memory location whose address is at memory location NUM to register R1.

(OR)

5. (a) Demonstrate the pipeline organisation for following example Ai*Bi+Ci for i =1,2,3,..... (7M) CO3
(b) Illustrate the behavior of a pipeline using space-time diagram. (7M) CO3

UNIT – III

6. (a) Explain about process control registers. (7M) CO4

(b) Explain about accessing i/o devices. Draw i/o interface diagram. (7M) CO4

(OR)

7. (a) Write about PCI bus and SCSI bus. (7M) CO4
(b) Explain about bus structure with neat diagram. (7M) CO4

UNIT – IV

8. (a) Briefly explain about DMA. (7M) CO5
(b) Write about daisy chaining priority interrupts. (7M) CO5

(OR)

9. (a) Derive and explain an algorithm for adding and subtracting two floating point binary numbers. (7M) CO6
(b) Describe the algorithm for integer division with suitable examples. (7M) CO6

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Hall Ticket Number:

CS/IT214(R20)

B.TECH. DEGREE EXAMINATION, AUGUST-2022

Semester III [Second Year] (Supplementary)

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)	Define Data Abstraction.	CO1
(b)	What is the complexity of insertion sort?	CO1
(c)	Define Time and space complexities.	CO1
(d)	What is collision in hashing?	CO2
(e)	Define pointer.	CO2
(f)	What are the disadvantages of circular linked list?	CO2
(g)	Write down the QUEUE full condition for a circular queue.	CO3
(h)	What is an expression? Give an example.	CO3
(i)	What are the disadvantages of representing a linear queue using array?	CO3
(j)	State the properties of a binary tree.	CO4
(k)	Define Binary Search Tree.	CO4
(l)	What is complete binary tree?	CO4
(m)	List various rotations in AVL Tree.	CO4
(n)	Define Heap.	CO4

UNIT – I

2. (a) Evaluate time and space complexity of an algorithm with an example. (7M) CO1
   (b) Illustrate asymptotic notations with suitable examples. (7M) CO1

(OR)

3. (a) Define linear search and explain the working principle with an example. (7M) CO1
   (b) Discuss insertion sort algorithm with an example. (7M) CO1

UNIT – II

4. (a) List various operations of linked list and explain how to insert a node anywhere in the list. (7M) CO2
   (b) Show how to reverse a single linked list. (7M) CO2

(OR)

5. (a) Define Static hashing. Explain with an example. (7M) CO2
   (b) Explain collision resolution using chaining and bucket addressing methods. (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 / 7 +? (7M) CO3
   (b) Write an algorithm for basic operations of stack. (7M) CO3

(OR)

7. (a) Convert the following expression into its corresponding post fix form using the prescribed algorithm. (300+23)*(43-21)/(84+7). Do the evaluation of resultant postfix expression. (7M) CO3
   (b) Explain basic operations of queue. List the steps to implement queue using stack. (7M) CO3

UNIT – IV

8. (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 with an example. (7M) CO4

(OR)

9. (a) Compare and contrast B Tree and B^+ Tree. (7M) CO4
   (b) Assume that t = 2. Draw the B-tree that will be created after inserting the following elements (in this order) A, B, C, D, G, H, K, M, R, W, Z. (7M) CO4

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Hall Ticket Number:

CS/IT215(R20)

B.TECH. DEGREE EXAMINATION, AUGUST-2022

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)	Define constructor.	CO1
(b)	List out parameter passing techniques.	CO1
(c)	List the methods of scanner class.	CO1
(d)	Define method overriding.	CO2
(e)	Distinguish class and interface.	CO2
(f)	What is object class?	CO2
(g)	Explain the usage of try.	CO3
(h)	List out the event sources.	CO3
(i)	Write any two mouse events.	CO3
(j)	Explain the concept of garbage collection.	CO1
(k)	List the components of AWT.	CO4
(l)	List any two event classes.	CO4
(m)	Distinguish JApplet and JFrame.	CO4
(n)	Define Adapter class.	CO4

UNIT – I

2. (a) Explain about method overloading with an example program. (7M) CO1
   (b) What is an Array? Explain about types of arrays in Java. (7M) CO1

(OR)

3. (a) Write a Java program for sorting the values in an Array. (7M) CO1

(b) Explain variables and data types in Java. (7M) CO1

UNIT – II

4. (a) Explain about String Builder class with an example program. (7M) CO2
   (b) Explain about method overriding with an example program. (7M) CO2

(OR)

5. (a) Explain implementing thread using Runnable interfaces with program. (7M) CO2
   (b) Explain throw statement with the help of an example program. (7M) CO2

UNIT – III

6. (a) Explain synchronization in Java? Explain synchronization method in Multithreading. (7M) CO3
   (b) What is applet life cycle and where the applets are executed. (7M) CO3

(OR)

7. (a) Explain EventListener interfaces. (7M) CO3
   (b) Write short notes on Exception types, uncaught Exceptions and benefits of Exception handling. (7M) CO3

UNIT – IV

8. (a) Explain any three AWT controls with an example program. (7M) CO4
   (b) Write short notes on Icons and Labels in swings. (7M) CO4

(OR)

9. (a) Describe about various components in Swing. (7M) CO4

(b) Explain accessing of collection via iterator. (7M) CO4

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