CSE(DS)

Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN | | | | | | | | | | | **Course Code** | 2 | 2 | M | D | A | 3 | 1 |

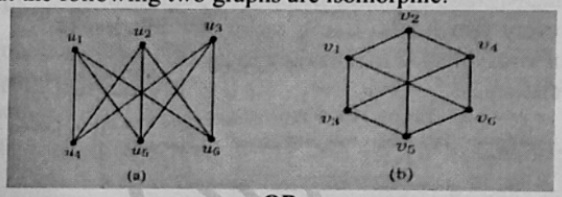
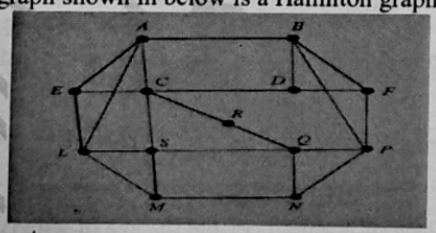
Third Semester B.E. Degree Examinations, March/April 2024

GRAPH THEORY & DISCRETE MATHEMATICAL STRUCTURES, PROBABILITY & STATITICS

[Common to AIML, CSE(AI) and CSE(DS)]

Duration: 3 hrs **Max. Marks: 100**

Note: *1. Answer any* **FIVE** *full questions, choosing* **ONE** *full question from each module.*
2. Handbook is permitted.
3. Missing data, if any, may be suitably assumed.

Q. No		Question	Marks	(RBTL:CO:PI)
		MODULE – 1		
1.	a.	Show that a complete graph with $n$vertices, namelyK_n, has $\frac{1}{2}n(n-1)$ edges.	06	(2 :1 : 1.2.1)
	b.	For a graph with n vertices and m edges, if δ is the minimum and Δ is the maximum of the degrees of vertices, show that $\delta \leq \frac{2m}{n} \leq \Delta$.	07	(2 :1 : 1.2.1)
	c.	Show that the following two graphs are isomorphic: 	07	(2 :1 : 1.2.1)
		OR		
2.	a.	Show that the graph shown in below is a Hamilton graph. 	06	(2 :1 : 1.2.1)
	b.	Exhibit the following • A graph which has both an Euler circuit and Hamilton cycle. • A graph which has an Euler circuit but no Hamilton cycle. • A graph which has a Hamilton cycle but no Euler circuit. • A graph which has neither a Hamilton cycle nor an Euler circuit.	07	(2 :1 : 1.2.1)
	c.	In the complete graph with n vertices, where n is an odd number ≥ 3, there are $(n-1)/2$ edge-disjoint Hamiltonian cycles	07	(2 :1 : 1.2.1)
		MODULE – 2		
3.	a.	Let $A = \{1, 2, 3, 4\}$ and let R be the relation on A defined by xRy if and only if "x divides y", written $x \mid y$.(a) Write down R as a set of ordered pairs (b) Draw the digraph of R.(c) Determine the in-degrees and out-degrees of the vertices in the digraph	06	(2 :2 : 1.2.1)

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

b. Let $A = \{u, v, x, y, z\}$ and R be a relation on A whose matrix is as given below. Determine R and also draw the associated digraph. **07** (2 :2 : 1.2.1)

$$M(R) = \begin{bmatrix} 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 \end{bmatrix}$$

c. Let$A = \{1,2,3,4,6,12\}$. On A, define the relation R by aRb if and only if a divides b. Prove that R is a partial order on A. Draw the Hassedigram for this relation. **07** (2 :2 : 1.2.1)

OR

4. a. Let f and g be functions from R to R defined by $f(x) = ax + b$ and $g(x) = 1 - x + x^2$. If $(gof)(x) = 9x^2 - 9x + 3$, determine a, b. **06** (2 :2 : 1.2.1)

b. Let $p = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 4 & 3 & 5 & 1 & 2 & 6 \end{pmatrix}$ be a permutation of the set $A = \{1,2,3,4,5,6\}$. **07** (2 :2 : 1.2.1)

(a) Write p as a product of disjoint cycles.(b) Compute p^{-1}.
(c) Compute p^2 and p^3.
(d) Find the smallest positive integer k such that $p^k = I_A$.

c. Let$f: A \to B$, $g: B \to C$ and $h: C \to D$ be three functions. Then $(hog)of = ho(gof)$. **07** (2 :2 : 1.2.1)

MODULE – 3

5. a. The number of virus affected files in a system is 1000 (to start with) and this increases 250 % every two hours. Use a recurrence relation to determine the number of virus affected files in the system after one day. **06** (2 :3 : 1.2.1)

b. Solve the recurrence relation $2a_n - 3a_{n-1} = 0$, for $n \geq 1$, given that $a_4 = 81$. **07** (2 :3 : 1.2.1)

c. Solve the recurrence relation $a_n + a_{n-1} - 6a_{n-2} = 0$, for $n \geq 2$, given that $a_0 = -1$ and $a_1 = 8$ **07** (3 :3 : 1.2.1)

OR

6. a. Solve the recurrence relation $F_{n+2} = F_{n+1} + F_n$ for $n \geq 0$, given $F_0 = 0, F_1 = 1$. **06** (2 :3 : 1.2.1)

b. Solve the recurrence relation $a_{n+2} + 4a_{n+1} + 4a_n = 7$, $n \geq 0$. given that $a_0 = 1$, $a_1 = 2$. **07** (2 :3 : 1.2.1)

c. Solve the recurrence relation $a_{n+2} - 10a_{n+1} + 21a_n = 3n^2 - 2, n \geq 0$. **07** (3 :3 : 1.2.1)

MODULE – 4

7. a. The following data gives the age of husband (x) and the age of wife (y) in years. Form the two regression lines and calculate the age of husband corresponding to 16 years age of wife. **06** (2 :4 : 1.2.1)

x	36	23	27	28	28	29	30	31	33	35
y	29	18	20	22	27	21	29	27	29	28

b. Show that if θ is the angle between the lines of regression, then $\tan\theta = \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}\left(\frac{1-r^2}{r}\right)$ **07** (2 :4 : 1.2.1)

c. Ten students got the following percentage of marks in two subjects$x$ *and* y. Compute their rank correlation coefficient **07** (3 :4 : 1.2.1)

Marks in x	78	36	98	25	75	82	90	62	65	39
Marks in y	84	51	91	60	68	62	86	58	53	47

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

OR

8. **a.** Fit a straight line $y = ax + b$ for the following data: **06** (2 :4 : 1.2.1)

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

b. Fit a second degree parabola $y = ax^2 + bx + c$ in the least square sense for the following data and hence estimate y at $x = 6$ **07** (2 :4 : 1.2.1)

x	1.	2	3	4	5
y	10	12	13	16	19

c. Fit a least square geometric curve $y = ax^b$ for the following data. **07** (3 :4 : 1.2.1)

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

MODULE – 5

9. **a.** Find the value of k such that the following distribution represents finite probability distribution. Hence find its mean and standard deviation. also find $P(x \leq 1),\ P(x > 1),\ P(-1 < x \leq 2)$ **06** (2 :5 : 1.2.1)

x	-3	-2	-1	0	1	2	3
$P(x)$	k	$2k$	$3k$	$4k$	$3k$	$2k$	k

b. Find the mean and standard deviation of Binomial distribution **07** (2 :5 : 1.2.1)

c. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals, more than two will get a bad reaction **07** (2 :5 : 1.2.1)

OR

10. **a.** In an examination 7% of students score less than 35% marks and 89% of students score less than 60% marks. Find the mean and standard deviation if the marks normally distributed. ($given\ P(1.2263) = 0.39\ and\ P(1.4757) = 0.43$). **06** (2 :5 : 1.2.1)

b. The joint distribution of two random variables $X\ and\ Y$ is as follows **07** (2 :5 : 1.2.1)

X \ Y	-4	2	7
1	$1/8$	$1/4$	$1/8$
5	$1/4$	$1/8$	$1/8$

Compute: $(a)\ E(X) and\ E(Y)$
$(b) E(XY)\ \ (c)\sigma_x\ and\ \sigma_y\ \ \ (d) COV(X,Y)\ \ (e)\rho\,(X,Y)$

c. $X\ and\ Y$ are independent random variables. X takes the values 2, 5, 7 wih probability $1/2,\ 1/4,\ 1/4$ respectively. Y takes the values 3, 4, 5 with probabilities $1/3,\ 1/3,\ 1/3$. **07** (2 :5 : 1.2.1)

Find the joint probability distributions of X and Y
Show that covariance of $X\ and\ Y$ is zero.
Find the probability distributions of $Z = X + Y$

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Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

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USN | | | | | | | | | | |

Course Code : 22CS/AI/CA/CD32

Third Semester B.E. Degree Examinations, January/February 2024

DIGITAL SYSTEMS DESIGN AND COMPUTER ORGANIZATION

[Common to CSE, AIML,CSE(AI), CSE(DS)]

Duration: 3 hrs **Max. Marks: 100**

Note: *1. Answer any* **FIVE** *full questions, choosing* **ONE** *full question from each module.*
2. Missing data, if any, may be suitably assumed

Q. No		Question	Marks	(RBTL:CO: PI)
		MODULE – 1		
1.	a.	(i) Solve the following functions using K-Map to find minimum sum-of-products. **f(A, B,C,D)= ∑m(0, 1, 3, 5) + d(6, 8, 9, 10) and f(x, y, z)= xy`+x`y`+yz`** (ii) Solve the following functions using K-Map to find POS **f=b`d`+a`b+a`c+cd'**	10	(3 :1: 1.7.1)
	b.	Solve for the function F **(A, B, C, D) = ∑m (0, 3, 9, 10, 15, 19) + d (5, 6, 12, 14).** (i) Karnaugh map for F. (ii) Prime implicants of F. (Prime implicants containing only don't-cares need not be included.) (iii) Minimum sum of products for F. (iv) Minimum product of sums for F.	10	(3 :1: 1.7.1)
		OR		
2.	a.	(i)List all prime implicants and all minimum sum-of-products expressions using k-map: - **f (A, B, C, D) =Σm (0, 4, 11, 15) +Σd (5, 6, 7, 8, 9, 10)** (ii)Solve the below function using MEV technic and draw reduced circuit using Basic gates:- **f(A,B,C,D)=Σm(0, 2, 4, 13, 14)+Σd(5, 6, 7, 8, 9, 10)**	10	(3 :1: 1.7.1)
	b.	(i)Solve using QM method **F (a, b, c) = Σ m (0,1,2,5,6,7)** find minimum SOP. (ii)Solve using QM method **F(a,b,c)= A`B`C` + A`B`C +A`BC+AB`C** find minimum SOP	10	(3 :1: 1.7.1)
		MODULE – 2		
3.	a.	(i)What is multiplexer? Explain **4:1 MUX** using along with Truth table and Circuit diagram. (ii)Construct 16:1 mux and 8:1 mux for **F(a,b,c,d)= Σ m(0,1,2,5,6,7,11)**	10	(2:2: 1.7.1)
	b.	Explain 2:4 and 3:8 Decoder using along with Truth table and Circuit diagram.	10	(2 :2: 1.7.1)
		OR		
4.	a.	Explain PLA and PAL. Implement a Full Adder using a PAL.	10	(2 :2: 1.7.1)

	b.	Explain SR Flip Flop along with characteristics equation.	10	(2 :2: 1.7.1)
		MODULE – 3		
5.	a.	Explain 8-bit serial-in, serial-out shift register.	10	(2 :3: 1.7.1)
	b.	Construct MOD-8 counter using D and J K Flip Flops	10	(3 :3: 1.7.1)
		OR		
6.	a.	Construct Decade counter using JK Flip Flop	10	(3 :3: 1.7.1)
	b.	Explain: (i) Sequential parity checker and (ii) Register transfers	10	(2 :3: 1.7.1)
		MODULE – 4		
7.	a.	Explain steps of Basic operational concepts of computer for add LOCA, R1, With neat diagram.	08	(2 :4: 1.7.1)
	b.	Explain factors effecting performance of the computer? Give basic Performance equation and overall SPEC rating of computer.	08	(2 :4: 1.7.1)
	c.	Explain Big-Endian & Little-Endian. Show the content of the two memory words at address 1000 and 1004 after the name "BITM, Ballari" has been entered in both methods.	04	(2 :4: 1.7.1)
		OR		
8.	a.	Explain any 4 addressing modes with examples.	08	(2 :4: 1.7.1)
	b.	Solve and explain Y= (A+B) *(C+D) using one-address, two-address, three-address	07	(3 :4: 1.7.1)
	c.	What is Branching? Explain with example	05	(2 :4: 1.7.1)
		MODULE – 5		
9.	a.	Explain handling multiple devices: (i) Vectored interrupt and interrupt nesting. (ii) simultaneous request(daisy chain, arrangement of priority groups)	08	(2 :5: 1.7.1)
	b.	Explain I/O interface for an input device	05	(2 :5: 1.7.1)
	c.	What is DMA? What are it advantages? With supporting diagram, explain different registers used in DMA interface.	07	(2 :5: 1.7.1)
		OR		
10.	a.	Solve addition and subtraction of following numbers: (i) -5 and 7 (ii) -3 and -8 (iii) 5 and 10	06	(3 :5: 1.7.1)
	b.	Explain logic diagram : (i) 4-bit carry look ahead adder (ii) addition-subtraction logic network	07	(2 :5: 1.7.1)
	c.	Apply booth algorithm to perform the multiplication on +13 and -06.	07	(3 :5: 1.7.1)

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Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

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USN | | | | | | | | | | |

Course Code : 22CS/AI/CA/CD33

Third Semester B.E. Degree Examinations, January/February 2024

OPERATING SYSTEMS

[Common to CSE, AIML,CSE(AI), CSE(DS)]

Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
2. Missing data, if any, may be suitably assumed

Q. No		Question	Marks	(RBTL:CO: PI)
		MODULE – 1		
1.	a.	What is operating system? Discuss the view-points of user and system towards operating system in brief.	07	(1 :1: 1.7.1)
	b.	Distinguish between multiprocessor system and single –processor system. Explain in detail the advantages of multiprocessor system.	07	(2 :1: 1.7.1)
	c.	Compare multiprogramming and multitasking systems.	06	(2 :1: 1.7.1)
		OR		
2.	a.	What is Dual mode operation? With a neat diagram illustrate the working of dual mode operation of operating system.	07	(1 :1: 1.7.1)
	b.	Identify the responsibilities of OS with respect to (i) Process management (ii) Memory management (iii) Mass Storage management.	07	(2 :1: 1.7.1)
	c.	Define system call. List and explain different types of system calls.	06	(2 :1: 1.7.1)
		MODULE – 2		
3.	a.	Describe various scheduling criteria with the help of your own example for FCFS scheduling.	07	(1 :2: 1.7.1)
	b.	Discuss, for what all reasons a process may need to transit from one state to another, explain with the help of state transition diagram.	07	(2 :2: 1.7.1)
	c.	Describe the following: (i) Scheduling queues. (ii) Schedulers. (iii) Context switch	06	(2 :2: 1.7.1)
		OR		
4.	a.	Describe the implementation of IPC using shared memory and message passing with diagram.	07	(1 :2: 1.7.1)
	b.	Consider the following set of processes with length of CPU burst given in milliseconds	07	(2 :2: 1.7.1)

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Draw Gnatt chart for SJF, and Priority scheduling. Find turnaround time, waiting time for each process and also average turnaround time and average waiting time.

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

c. List and explain different multi-threading models. **06** (2 :2: 1.7.1)

MODULE – 3

5. a. List and explain the necessary conditions of deadlock with a suitable **07** (1 :3: 1.7.1)

b. Consider the following snapshot of a system **07** (2 :3: 1.7.1)

	ALLOCATION	MAX	AVAILABLE
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

(i) Compute the need matrix.(ii) Is the system in a safe mode? Give the safe sequence. (iii) If a request from P1 arrives for (0, 4, 2, 0), can the request be granted immediately? Explain.

c. What is fragmentation? Explain the types with appropriate examples. **06** (2 :3: 1.7.1)

OR

6. a. Discuss different methods for deadlock avoidance. **07** (1 :3: 1.7.1)

b. Why TLB is important? Explain with a neat diagram and EAT. **07** (2 :3: 1.7.1)

c. Explain about segmented memory management. And check if any address generates segment fault in the given snapshot. **06** (2 :3: 1.7.1)

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

(i) 0,99 (ii) 2,78 (iii) 1, 265 (iv) 3, 222 (v) 0, 111

MODULE – 4

7. a. If the required page is not available in memory, how to handle the situation in order to execute program, Illustrate with figure and steps. **07** (1 :4: 1.7.1)

b. List and Discuss in detail the possible operations on file and attributes of file. **07** (2 :4: 1.7.1)

c. What is thrashing? Explain how the working set model can be used to solve the same with suitable program. **06** (2 :4: 1.7.1)

OR

8. a. Describe different methods for keeping track of free space on disk. **07** (1 :4: 1.7.1)

b. Consider the following page reference string **07** (2 :4: 1.7.1)

1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6

Analyse how many page fault would occur for **LRU,FIFO** and **optimal** page replacement algorithm, assuming 3 free frames? Which one of the above is more efficient?

c. Explain various allocation methods in implementing file systems. **06** (2 :4: 1.7.1)

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

MODULE – 5

9.	a.	List and explain the disk scheduling algorithms.	07	(1 :5: 1.7.1)
	b.	Explain in detail about Disk management in storage structure.	07	(2 :5: 1.7.1)
	c.	Discuss in brief about process management and process scheduling in Linux.	06	(2 :5: 1.7.1)

OR

10.	a.	A drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at cylinder 143 and previous request was at cylinder 125.The queue of pending requests in FIFO order is: 86,1470,913,1774,948,1509,1022,1750,130.Starting from the current head position, what is the total distance travelled(in cylinders) by the disk arm to satisfy the requests using algorithms FCFS,SSTF,SCAN,LOOK. Illustrate with figure in each case.	07	(1 :5: 1.7.1)
	b.	With diagram, explain components of Linux system.	07	(2 :5: 1.7.1)
	c.	Describe about the swap space management in storage structure.	06	(2 :5: 1.7.1)

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Course Code : 22CS/AI/CA/CD34

Third Semester B.E. Degree Examinations, March/April 2024

DATA STRUCTURES AND APPLICATIONS

Duration: 3 hrs **Max. Marks: 100**

Note: *1. Answer any* **FIVE** *full questions, choosing* **ONE** *full question from each module.*
2. Missing data, if any, may be suitably assumed

Q. No		Question	Marks	(RBTL:CO: PI)
		MODULE – 1		
1.	a.	Define Data Structures. Give classification	04	(1 :1: 1.6.1)
	b.	Define Pointers and Explain how to declare and initialize a pointer variable. Write a program to illustrate the use of pointers.	06	(2 :1: 1.6.1)
	c.	List and Illustrate different types of Dynamic Memory Allocation functions with suitable program.	10	(3 :1: 1.7.1)
		OR		
2.	a.	Consider the two given polynomials $A(x)=5X^{200}+8X^3+2$ and $B(x)=10X^5-4x^3+X-6$ (i) Diagrammatically Represent the above polynomials using array of structure. (ii) Write the 'C' structure to define a polynomial of 'N' terms.	10	(2 :1: 1.6.1)
	b.	Write an Algorithm to Add two given Polynomials using array of structures	10	(3 :1: 1.7.1)
		MODULE – 2		
3.	a.	Write a C Program to Implement Stack Operations using Arrays.	08	(2 :2: 1.6.1)
	b.	Convert the following infix expressions to **postfix** format. **(i) (A+B)*D/(E-F)^G (ii) A-B/C*D^E**	06	(3 :2: 1.7.1)
	c	Outline the algorithm for evaluation of a valid postfix expression and Evaluate the expression abc*+d- where a=4, b=3, c=2 and d=5	06	(3:2:1.6.1)
		OR		
4.	a.	Write C- recursive function for i)Factorial of a Number ii) Tower of Hanoi	08	(2 :2: 1.6.1)
	b.	Write Qinsert and Qdelete and Qdisplay procedures for ordinary queue using arrays	06	(3 :2: 1.7.1)
	c.	Write C-functions for insert and delete operations on Circular queues.	06	(3:2:1.6.1)
		MODULE – 3		
5.	a.	With the C-statements, Illustrate how do you create a node, add and delete on Singly Linked List with proper message where each node is containing the details of employee in the form of EmpId, EmpName, Empaddr and EmpSalary as data fields.	10	(3 :3: 1.6.1)
	b.	(i) Implement the operations of a stack using Singly Linked List with the help of C-statements (ii) Implement the operations of a Queue using Singly Linked List List with the help of C-statements	10	(3 :3: 1.7.1)

OR

6.	a.	Implement addition and deletion of a NODE on a Doubly Linked List (DLL) with required C-Statements	08	(3 :3: 1.6.1)
	b.	State the advantage of Doubly linked List over Singly Linked List	02	(2 :3: 1.7.1)
	c.	Write the functions for: (i) Finding the length of the list (ii)Concatenate TWO lists	10	(3:3:1.6.1)

MODULE – 4

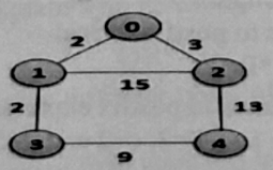
7.	a.	Define a tree. With suitable example explain (i) Binary tree (ii)Complete Binary Tree (iii)Degree of a node (iv)Level of a binary tree	05	(1 :4: 1.6.1)
	b.	Write Routines to traverse the given tree using (i) Preorder Traversal (ii)Post Order Traversal (iii)Inorder Traversal	09	(3 :4: 1.7.1)
	c	Write function to insert an element into a binary search tree	06	(3:4:1.7.1)

OR

8.	a.	Given the following traversal, draw a binary tree: (i)Inorder: 4 2 5 1 6 7 3 8 Postorder: 4 5 2 6 7 8 3 1 (ii)Preorder: A H C E I F J D G H K L Inorder: E I C F J B G D K H L A	10	(3 :4: 1.6.1)
	b.	Develop C functions to implement the following (i) Inserting a node into a tree (ii) Search a key value in a binary search tree	10	(3 :4: 1.7.1)

MODULE – 5

9.	a.	Define the following (i) Digraph (ii)Weighted graph (iii)Self Loop (iv)Adjacency matrix	04	(1 :5: 1.6.1)
	b.	Write an algorithm for Breadth First search and Depth First Search	08	(3 :5: 1.7.1)
	C	Define Graphs. Give the Adjacency matrix and Adjacency list representation for the following graph.	08	(3 :5: 1.7.1)



OR

10.	a.	Define Hashing. Explain any three Hash functions	10	(2 :5: 1.6.1)
	b.	Explain Static and Dynamic hashing in detail	10	(2 :5: 1.7.1)

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(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN | | | | | | | | | | |

Course Code : 22CS/AI/CA/CD36

Third Semester B.E. Degree Examinations, March/April 2024

OBJECT ORIENTED PROGRAMMING WITH JAVA

Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any FIVE full questions, choosing ONE full question from each module.***
2. Missing data, if any, may be suitably assumed

Q. No		Question	Marks	(RBTL:CO: PI)
		MODULE – 1		
1.	a.	Discuss the various primitive data types used in Java.	06	(2 :1:2.1.3)
	b.	What is a Variable? Explain the different types of variable available in Java.	06	(2 :1:2.1.3)
	c.	List and explain the various iteration statements in Java. Write a JAVA program to check whether given number is palindrome or not.	08	(3 :1: 2.1.3)
		OR		
2.	a.	Explain logical and bitwise operators with an example.	06	(2 :1: 2.1.3)
	b.	Explain type conversion in JAVA with example.	06	(2 :1: 2.1.3)
	c.	With an example, explain ternary operator. Write a JAVA program to find the largest of three numbers using Ternary operator.	08	(3: 1 :2.1.3)
		MODULE – 2		
3.	a.	Explain class with an example.	06	(2 :2: 2.1.3)
	b.	Explain the object reference variables.	06	(2 :2: 2.1.3)
	c.	What are constructors? Explain with an example.	08	(3:2: 2.1.3)
		OR		
4.	a.	What is inheritance? Discuss different types of inheritance with suitable example.	06	(2 :2: 2.1.3)
	b.	Mention and explain the use of final keyword in JAVA.	06	(3 :2: 2.1.3)
	c.	Distinguish between Method overloading and Method overriding in JAVA with suitable example.	08	(3:2: 2.1.3)
		MODULE – 3		
5.	a.	What is an interface? Illustrate with an example how interfaces are created and implemented in Java.	06	(2 :3: 2.1.3)
	b.	What is package? Explain how to define and implement interfaces by taking suitable example.	06	(2 :3:2.1.3)
	c.	Demonstrate working of nested try block with an example.	08	(3:3:2.1.3)
		OR		
6.	a.	Draw state transition diagram of a thread and describe its life cycle.	06	(1 :3: 2.1.3)
	b.	List and explain the different methods of Thread Class.	06	(1 :3: 2.1.3)
	c.	Write a program to demonstrate Thread priorities in JAVA.	08	(3:3: 2.1.3)

MODULE – 4

7.	a.	Explain Delegation event model used to handle events in JAVA,	10	(2 :4: 2.1.3)
	b.	Explain action event class & adjustment event class	10	(2 :4: 2.1.3)
		OR		
8.	a.	What is event Listener interface and explain any two interfaces with syntax.	10	(2 :4: 2.1.3)
	b.	Explain with suitable example implementation of inner class.	10	(2 :4: 2.1.3)

MODULE – 5

9.	a.	Compare AWT and Swings.	10	(2 :5: 2.1.3)
	b.	Write a program to create a JTable with the column headings Name, USN, age, address & insert records and display.	10	(3 :5: 2.1.3)
		OR		
10.	a.	Explain briefly the components and containers used in Swings	10	(2 :5: 2.1.3)
	b.	Explain the following with suitable code (i). JLabel (ii). JComboBox.	10	(3 :5: 2.1.3)

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Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN | | | | | | | | | | |

Course Code : 22CS/AI/CA/CD383

Third Semester B.E. Degree Examinations, March/April 2024

R PROGRAMMING

Duration: 2 hrs **Max. Marks: 100**

Instructions to the Candidates:

- ***All questions are compulsory***
- ***Each question carries 1 mark***
- ***Use only black ball point pen***
- ***Darkening two circles for the same question makes the answer invalid***
- ***Damaging/overwriting, using whiteners on the OMR are strictly prohibited.***

Q. No	*Question*			
1	If a command is not complete at the end of a line, R will give a different prompt, by default it is			
	a) *	b) -	c) +	d) /
2	If you explicitly want an integer, you need to specify the			
	a) D	b) R	c) L	d) K
3	What is the output of the following code? seq(from=1, to=9, by=2)			
	a) 1 3 5 7 9	b) 1 3 5 7 9 11	c) 1 2 3 4 5 6 7 8 9	d) Error
4	What is the output generated by the following code? >seq(by = -2,9,1)			
	a) 9 7 5 3 1	b) 1 3 5 7 9	c) 1 3 9 7 5	d) 5 7 9 3 1
5	What is the output generated by the following expression: c(1,2,3,4)+ c(1, 2)			
	a) 2 4 4 6		a) 2 4 4 6	
6	What is the output for the following function? >x<-c(1,1, 2, 3, 5, 8, 13); > which(x%%3==0)			
	a)2,8	b)4	c)2,3,8	d)5,6
7	Given c(5,1,4,3,2). The result of SORT(x) is:			
	a)1 2 3 4 5	b) Error	c)5 4 3 2 1	d) Warning message
8	Given c(11,NA,13), What is the value of the expression mean(a) is			
	a)NA	b)12	c)Error	d) Warning message
9	Given c(1, 1, 2, 3, 5, 8, 13), then which(x% /%2 > 2)			
	a)3 6	b)3 5 8 13	c)4 5 6 7	d)6 7
10	If A = c (1, 13, 42, 13, 4) then what is A = A [-4]?			
	a) 1, 13, 42, 4	b) 1, 13, 42,	c) 1, 42, 13, 4	d) 1 3
11	Which function is used to add additional columns in a matrix?			
	a) add()	b) cbind()	c) join()	d) append_item()
12	What is the output of the following code : pmax (c(1,2,3),c(3,2,1),c(2,2,2))			
	a) 1 2 1	b) 2 1 2	c) 1 3 1	d) 3 2 3
13	Which of the following R code extracts the second column for the following matrix? > x ← **matrix**(1:6, 2, 3)			
	a) x[2,]	b) x[1, 2]	c) x[, 2]	d) x[1 1 2]

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

14 What will be the output of the following R code?
```
> x <- 3
> switch(x, 2+2, mean(1:10), sum(1:5))
```
a) 15 b) 5.5 c) NULL d) Error

15 What will be the output of the following R code?
sum((1:3)^2)

a)12 b) 13 c) 14 d) 11

16 Which function is used to display output?

a) show() b) read() c) printf() d) display()

17 What will be the output of the following R code?
```
> x <- data.frame(foo = 1:4, bar = c(T, T, F, F))
> ncol(x)
```
a)2 b)7 c)4 d)9

18 Which of the following extracts first element from the following R vector?
```
> x <- c("a", "b", "c", "c", "d", "a")
```
a) x[0] b) x[1] c) x[2] d) x[10]

19 An ordered collection of objects or components are called _____

a) Datasets b) Lists c) Databases d)Dataframe

20 Point out the correct statement? Note: (A: True and B:False)

a) ifelse(test, B, A) b) elseif(test, A, B) c) if (test, A, B) d) ifelse(test, A, B)

21 Which of the following statement is alternative to ____?solve

a) help(solve) a) help(solve) a) help(solve) a) help(solve)

22 R has how many atomic classes of objects?

a) 1 b) 2 c) 3 d) 5

23 The _____function can be used to create vectors of objects by concatenating things

a) cpl() b) c() c) concat() d) con()

24 R files has an extension_____

a) . R b) . S c) . Rp d) .c

25 What is the command to print the sorted list in reverse order?

a) sort(y) b) rev(sort(y)) c) sort(rev(y)) d) rev(y)

26 Which of the following statements is true about missing values in R?

a) R automatically replaces missing values with the mean of the non- b) Missing values are denoted by the character "NA" a) R automatically replaces missing values with the mean b) Missing values are denoted by the character "NA"

27 What is the output generated by the command: rep(1:5,each=2)

a)1 1 2 2 3 3 4 4 5 5 b)1 2 3 4 5 c) 1 2 3 4 5 1 2 3 4 5 d) All are correct

28 Given c(5,1,4,3,2). The result of rev(sort(x)) is:

a)1 2 3 4 5 b)5 4 3 2 1 c) Error d) Warning message

29 What is a variable in R?

a) A constant value b) A storage location associated with a symbolic name c) A keyword used in R d) A function that returns a value

30 In R, what does the typeof() function do?

a) Checks if a variable is null b) Returns the type of variable c) Checks for variable existence d) Converts variable types

31 What is the output of the following code : pmin (c(1,2,3,0),c(3,2,1),c(2,2,2))

a) 1 2 1 b) 1 2 1 c) 1 2 1 d) 1 2 1

32 What is the output of the following code : pmax (c(1,2,3),c(3,2,1),c(2,2,2))

a) List all objects b) List all objects c) List all objects d) List all objects

33 ---------- is used to skip an iteration of a loop.

a) Next b) skip c) group d) cancel

34 What will be the output of the following R code?

```
> y <- "fruit"
> switch(y, fruit =" ",banana", vegetable = "broccoli", "Neither")
```

a) "banana" b) "Neither" c) "broccoli" d) Error

35 What will be the output of the following R code?

```
> x <- 2
> switch(x, 2+2, mean(1:10), sum(1:5))
```

a) 15 b) 4 c) NULL d) error

36 What will be the output of the following R code?

```
sum((1:3)^2)
```

a) 14 b) 24 36 c) 216

37 cat() function is used to concatenate two or more strings?

a) Yes b) No c) Error

38 What will be the output of the following R code? > x <- data.frame(foo = 1:6, bar = c(T, T, F,

a) 2 b) 7 c) 4 d) ERROR

39 Name the function to create a data frame?

a) df() b) dframe() c) dataframe() d) data.frame()

40 Collection of objects currently stored in R is called as _____

a) list b) task c) workspace d) package

41 An ordered collection of objects are called as -----

a) Lists b) Factor c) Matrix d) Functions

42 The following values: 10.5, 55 and 787, belongs to which data type?

a) numeric b) integer c) complex d) All of the above

43 ---------- function is used to enter the data directly from the keyboard?

a) SCAN( ) b) Scan(); c) scan( ) d) Scandata( )

44 To bind a row onto an already existing matrix, the _____ function can be used.

a) Sbnd( ) b) cbind( ) c) rbind( ) d) bind( )

45 A ---------- is a two-dimensional rectangular data set.

a) Vector b) Lists c) Matrix d) Functions

46 Data frames can be converted to a matrix by calling data _____

a) as.mat() b) as.matr() c) as.mat() d) as.matrix()

47 Which function is used to find the amount of rows and columns in an array?

a) dim() b) dimension() c) nr x nc() d) length()

48 -------- is used to apply a function over subsets of a vector.

a) mapply() b) lapply() c) apply() d) tapply()

49 lapply functions takes ---------- number of arguments in R language.

a) two b) three c) four d) five

50 Identify the function which is used to return a subset of the columns of a data frame in R

a) subset b) retrieve c) get d) set

51 --------removes all the variables from the workspace.

a) rm(list=ls()) b) rm(list=ls()) c) rm(list=ls()) d) rm(list=ls())

52 Data frames contains which of the following types of data?

a) Integers only b) Integers only c) Integers only d) Integers only

53 Identify the command to select the first row of a data frame named df in R?

a) df[0,] b) df[0,] c) df[0,] d) df[0,]

54 The --------- is used for reading tabular data?

a) read.csv ( ) b) read.csv ( ) c) read.csv ( ) d) read.csv ( )

55 When we use length.out argument in seq() function, the system decides by what units the decrement should happen while generating a sequence.

a. TRUE b. FALSE c. Unknown

56 Which function is used to determine the names assigned to a list?

a) names b) name c) Name

57 How do you insert COMMENTS in R code?

a) #This is a comment b) /*This is a comment c) //This is a comment d) /**This is a comment

58 What will be the output of the following R code?

```
> x <- 1:4; y <- 6:9; z <- x + y
```

a) 7 9 11 13 a) 7 9 11 13 a) 7 9 11 13 a) 7 9 11 13

59 > x <- 0:6; as.logical(x)

a) FALSE TRUE TRUE TRUE TRUE TRUE TRUE a) FALSE TRUE TRUE TRUE TRUE TRUE TRUE a) FALSE TRUE TRUE TRUE TRUE TRUE TRUE a) FALSE TRUE TRUE TRUE TRUE TRUE TRUE

60 What will be the output of the following R code?

```
f <- function() {
        ## This is an empty function
}
f()
```

a) 0 b) No result c) NULL d) 1

61 Functions are having ----- number of components

a. 1 b. 2 c. 3 d. 4

62 The _____ function returns a list of all the formal arguments of a function

a) formals() a) formals() a) formals() a) formals()

63 In R environment the Function is stored as ------ with this name.

a. Object b. Function c. Class d. Memory

64 Given the expression: vector <- c(3, 5, 2, 3, 1, 4), then the function print(range(vector)) returns the -------- value

a. 1 5 b. 5 c. 3 d. 1 and 5

65 Functions are defined using the _____ directive and are stored as R objects

a. function() b. funct() c. functions() d. fun()

66 In a function, the value of the expression output is returned as the value of the function.

a. True b. False

67 A function can have _____ number(max) of arguments

a) 1 b) 2 c) 3 d) n

68 An argument is

a) Place holder b)variable c) function d) None of the above

69 Arguments can have default values

a) True b) False

70 _____ function in R programming are predefined functions that are available to perform common task or operations

a) variable b)constant c) user defined d) built-in

71 What is the output of the function print(sum(4:6))

a) 10 b) 15 c) 4 d) 6

72 The expression if(x%%2==0) then it returns the value which is _____ number

a) even b) odd

73 F=function(x) x^2*4+x/3 is _____ function

a) Inline b) Built-in c) user defined d) None of the above

74 What will be the output of the following R code snippet?

```
lm <- function(x) { x * x }
> lm
```

a) function(x) { x * x b) func(x) { x * x } c) function(x) { x / x } d) function { x $ x }

75 What will be the output of the following R code?

```
> g <- function(x) {
        a <- 3
        x+a+y
       ## 'y' is a free variable
}
> y <- 3
> g(2)
```

a) 9 b) 42 c) 8 d) Error

76 When a function has more than one return statement, in which case it stops after executing the ---- one it reaches.

a. First b. Last 3. both a and b. 4. Not Executes

77 The structure of an R object is represented by ---------- function

a. str() b. abs(0 c. structure() d. print structure

78 The built-in function exists() returns TRUE or FALSE depending on whether or not a variable is defined in the R environment

a. TRUE b. FALSE

79 ---------- function in R returns the minimum and maximum values of a numeric vector

a. max() b. min() c. avg() d. range()

80 Given the expression: vector <- c(3, 5, 2, 3, 1, 4), then the function print(median(vector)) returns the -------- value

a. 1 b. 2 c. 3 d. 4

81 Given > a <- c(1,4,5,7), b <- c(1,2,5,9), the result of >setdiff(a,b) is
a. 4 7 b. 2 9 c. 1 d. 9

82 The function add <- function(x, y) { return(x + y) } is syntactically correct?
a. Yes b. No

83 Vectors are usually ------ data structures in R programming
a. 1 Dimensional b. 2 Dimensional c. Both a and b

84 The function Test <- function (x y) { return(x / y) } will execute properly?
a. Yes b. No

85 Vector functions in R allow us to either create or manipulate the ---------- called vectors.
a. Function b. Procedure c. Data Structure d. Data

86 In the rep(x, …), the argument length.out represents the ---------- of the output vector.
a. Number of b. Length c. Max of elements d. Min of Elements

87 The output generated by the function X <- rep(c(1,5,9),1)
print(X) is?
a. 159 b. 951 c. 1 5 9 d. 1

88 What is the output of the following command?
sequence <- seq(from= 1, to= 2, length.out = 2)
print(sequence)
a. 1.0 1.5 2.0. 2.5 b. 1 2 c. 0.5 1.0 1.5 2.0 d. 1 2 3 4 5

89 What is the output of the following command?
x <- seq(from= 1, to= 5, by= 1)
print(any(x > 2))
a. FALSE b. TRUE c. 3 4 5

90 What is the output of the following command?
p <- seq(from= 1, to= 4, by= 1)
q <- seq(from= 5, to= 8, by= 1)
print(any(p + q = 6))
a. TRUE b. FALSE c. ERROR

91 What is the output of the following code?
x <- seq(from= 1, to= 5, by= 0.5)
print(all(x > 0))
a. TRUE b. FALSE c. ERROR

92 A function that calls itself is called a recursive function and this technique is known as ----------
a. Function b. Recursive c. Recursion d. R Script

93 A series of function calls in which one function calls another, which in turn calls the original function is called as:
a. Recursion b. Direct Recursion C. Indirect Recursion Recursive Function

94 Multiple functions that call each other repeatedly make up ---------- recursion.
a. Structural b. Direct c. Indirect d. Mutual

95 The --------- function is used to give all the information on how your function arrived at an error.
a. traceback() b. browser() c. recover()

96 ---------- function displays the error during evaluations.
a. browser() b. recover() c. traceback()

97 In --------- mode, we can modify objects, look at the objects in the current environment, and also
a. Debug b. Recover c. Browser d. Traceback

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

98 To print a stack trace in a debug mode --------- command is used
a. print b. where c. ls( )

99 To leave debugger and continue with execution ------ command is used
a. c b. C c. Next d. s

100 The output generated by the function X <- rep(c(1, 5, 9), length.out = 1)
a. 1 b. 1 5 9 c. 159 d. None

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