



USN

--	--	--	--	--	--	--	--	--	--

21CS32

**Third Semester B.E. Degree Examination, Jan./Feb. 2023**  
**Data Structures and Applications**

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

**Module-1**

- 1 a. What is linear array? Discuss the representation of linear array in memory. (06 Marks)
- b. Differentiate between static and dynamic memory allocations. Discuss four dynamic memory allocation functions. (06 Marks)
- c. Write a menu driven program in C for the following array operations:
  - (i) Inserting an element (ELEM) at a given valid position.
  - (ii) Deleting an element at a given valid position.
  - (iii) Display of array elements.
  - (iv) Exit
 Support the program with functions for each of the above operations. (08 Marks)

**OR**

- 2 a. Give Abstract Data Type (ADT) for arrays. How array can be declared and initialized? (06 Marks)
- b. With suitable example, discuss self-referential structures. (06 Marks)
- c. Define Sparse matrix. How to represent a Sparse matrix? Write an algorithm/function to transpose a given Sparse matrix. (08 Marks)

**Module-2**

- 3 a. Define Stack. Discuss how to represent stack using dynamic arrays. (06 Marks)
- b. Write a menu driven C program for the following operations on STACK of integers:
  - (i) Push an element on to stack
  - (ii) Pop an element from the stack
  - (iii) Display the content of stack
  - (iv) Exit
 Show the overflow and underflow conditions. (06 Marks)
- c. What are the disadvantages of ordinary queue? Discuss the implementation of circular queue using arrays. (08 Marks)

**OR**

- 4 a. What is Recursion? Write recursive function to solve Towers of Hanoi problem. (06 Marks)
- b. Discuss the following:
  - (i) Double Ended Queue
  - (ii) Priority Queue
 (06 Marks)
- c. Write an algorithm to convert infix expression to postfix expression. Show the content of stack to convert the following infix expression:  
 $A * (B + D) / E - F * (G + H / K)$  (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Write a C function to concatenate two singly linked list. (06 Marks)  
 b. Give the structure definition for singly linked list. Write a C function to:  
 (i) Insert an element at the end  
 (ii) Delete a node at the beginning (08 Marks)  
 c. Discuss how to read a polynomial consisting of 'n' terms implemented using linked list. (06 Marks)

## OR

- 6 a. Write a function to delete a node whose information field is specified in singly linked list. (06 Marks)  
 b. What is circular doubly linked list? Write a C function to perform the following operations on circular doubly linked list:  
 (i) Insert a node at the beginning  
 (ii) Delete a node from the list (08 Marks)  
 c. Discuss how to implement stacks and queues using linked list. (06 Marks)

Module-4

- 7 a. Define binary tree. List and discuss any two properties of binary tree. (06 Marks)  
 b. Write a function to perform the following operations on Binary Search Tree (BST):  
 (i) Deletion from a BST  
 (ii) Inserting an element into a BST (08 Marks)  
 c. Define Threaded Binary Tree. Discuss In-threaded binary tree. (06 Marks)

## OR

- 8 a. Discuss how binary tree are represented using (i) Array (ii) Linked list (06 Marks)  
 b. Discuss inorder, preorder, postorder and level order traversal with suitable recursive function for each. (08 Marks)  
 c. Write a C function to evaluate an expression using expression tree. (06 Marks)

Module-5

- 9 a. Design a C program for the following operation on Graph (G) of cities:  
 (i) Create a graph of N cities using adjacency matrix  
 (ii) Print all the nodes reachable from a given starting node in a digraph using BFS/DFS method (10 Marks)  
 b. Discuss AVL tree with an example. Write a function for insertion into an AVL tree. (10 Marks)

## OR

- 10 a. Define hashing. What are the two criteria, a good hash function should satisfy? Discuss open addressing and chaining method with an example. (10 Marks)  
 b. Define Red-Black tree, Splay tree and B tree. Discuss the method to insert an element into Red-Black tree. (10 Marks)

\*\*\*\*\*

USN

--	--	--	--	--	--	--	--	--	--

21CS33

## Third Semester B.E. Degree Examination, Jan./Feb. 2023 Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Derive an expression for collector current and collector emitter voltage of voltage divider bias circuit (accurate analysis). (08 Marks)
- b. Explain relaxation oscillator. (06 Marks)
- c. Sketch and explain the working of Peak detector. (06 Marks)

OR

- 2 a. Explain R-2R ladder type DAC with a neat diagram. (06 Marks)
- b. List the advantages of active filters over passive filters. (06 Marks)
- c. For the circuit shown in Fig. Q2 (c) below find the value of  $R_1$  and  $R_2$  if supply voltages are +12 and -12 V. Assume hysteresis with -6 V.

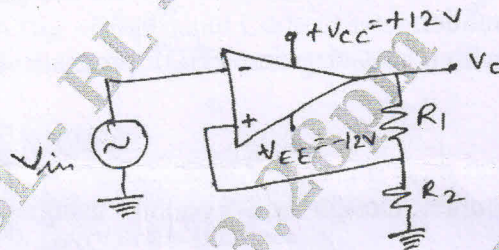


Fig. Q2 (c)

(08 Marks)

### Module-2

- 3 a. Find all the prime implicants of the function,  
 $f(a, b, c, d) = \Pi(0, 2, 3, 4, 5, 12, 13) + \Pi d(8, 10)$   
 using the Quine-McCluskey method. (10 Marks)
- b. Plot the Karnaugh maps and find all the minimal sums and minimal products of the following Boolean functions.
  - (i)  $f(a, b, c) = \sum(2, 4, 5, 6, 7)$
  - (ii)  $f(a, b, c) = \Pi(1, 4, 5, 6)$  (10 Marks)

OR

- 4 a. With an example, explain Petrik's method. (06 Marks)
- b. For the given Boolean function, determine a minimal sum and a minimal product using MEV techniques using a, b and c as the map variables.  
 $f = \sum(3, 4, 5, 7, 8, 11, 12, 13, 15)$  (08 Marks)
- c. Explain Entered variable map method. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**Module-3**

- 5 a. Explain the importance of three-state buffer. (06 Marks)
- b. With a neat diagram, explain 3 to 8 line decoder. (06 Marks)
- c. What is a multiplexer? Write the logic diagram for 8 : 1 multiplexer using 4 input AND and OR gates. (08 Marks)

**OR**

- 6 a. Discuss different types of hazards in combinational circuits. (08 Marks)
- b. Distinguish between combinational and sequential circuit. (06 Marks)
- c. Write a note on PLA and PAL. (06 Marks)

**Module-4**

- 7 a. Explain the working of JK master slave flip-flop with a sketch, truth table and symbol. (06 Marks)
- b. What is D flip flop? Illustrate the operation of the clear and preset inputs in D-flip-flop with timing diagram. (08 Marks)
- c. What is VHDL? Show how to model the 4 to 1 multiplexer using a VHDL conditional assignment statement. (06 Marks)

**OR**

- 8 a. What is T-flip-flop? Show how to convert D-flip flop into T-flip-flop. (08 Marks)
- b. What are the three different models for writing a module body in VHDL? Give example for any one model. (06 Marks)
- c. Explain with a neat diagram, VHDL program structure. (06 Marks)

**Module-5**

- 9 a. With a neat diagram, explain 4-bit parallel adder with accumulator. (10 Marks)
- b. Define counter. Design mod-5 counter using J-K flip flop. (10 Marks)

**OR**

- 10 a. With neat diagram, explain 4 bit SISO register. (08 Marks)
- b. Mention the Application of shift registers. (05 Marks)
- c. Explain the working of a 3 bit shift register. (07 Marks)

\*\*\*\*\*

USN

--	--	--	--	--	--	--	--	--	--

21CS34

## Third Semester B.E. Degree Examination, Jan./Feb. 2023 Computer Organization and Architecture

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. With the help of a neat block diagram discuss the basic operational concept of a computer. (08 Marks)
- b. Write a program to evaluate the arithmetic statement  $Y = (A + B) * (C + D)$  using three address, two address, one address and zero address instruction. (08 Marks)
- c. Write the basic performance equation indicate the role of each parameter in the equation. (04 Marks)

OR

- 2 a. Define Addressing Mode. Explain the various addressing mode. (10 Marks)
- b. With proper example explain Big - Endian and Little - Endian of byte addressing. (06 Marks)
- c. What is performance measurement? Explain the overall SPEC rating of a computer. (04 Marks)

### Module-2

- 3 a. With respect to handling interrupts from multiple devices explain:  
(i) Interrupt nesting (10 Marks)  
(ii) Dairy chain method.
- b. What is Bus arbitration? Explain centralized and distributed arbitration method with neat diagrams. (10 Marks)

OR

- 4 a. Illustrate a program that reads one line from keyboard, stored it in memory buffer and echoes if back to display in I/O interfaces. (10 Marks)
- b. Discuss with a neat circuit diagram, the general 8 bit parallel interface circuit. (10 Marks)

### Module-3

- 5 a. Explain the internal organization of 16-megabit DRAM chip configured as  $2M \times 8$ . (08 Marks)
- b. With a neat figure illustrate the structure of synchronous DRAM (SDRAM). (08 Marks)
- c. Discuss about any two types of Read Only Memory (ROM). (04 Marks)

OR

- 6 a. State the importance of cache memory and describe the different types of cache mapping techniques with diagram. (12 Marks)
- b. With relevant figure explain organization of  $(1k \times 1)$  memory chip. (08 Marks)

### Module-4

- 7 a. With the help of logic diagram explain 4-bit carry look adder and its operation. (10 Marks)
- b. Illustrate the hardware arrangement for sequential multiplication with an example. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Draw the single bus architecture and explain the control sequence for execution of instruction ADD (R3), R1. (10 Marks)  
b. With neat sketches, explain the detailed organization of hardwired control unit. (10 Marks)

Module-5

- 9 a. With a suitable example explain the concept of pipeline processing. (10 Marks)  
b. Draw and explain pipeline for floating point addition and subtraction. (10 Marks)

OR

- 10 a. With the help of flowchart and timing diagram explain four segment instruction pipeline. (10 Marks)  
b. Explain the organization of SIMD array processor with an appropriate diagram. (10 Marks)

\*\*\*\*\*

USN

--	--	--	--	--	--	--	--	--	--

Question Paper Version : B

**Third Semester B.E./B.Tech Degree Examination, Jan./Feb. 2023**  
**Samskruthika Kannada**

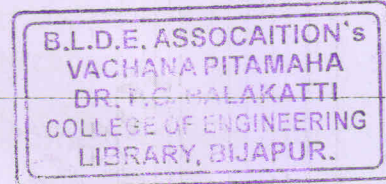
Time: 1 hr.]

[Max. Marks: 50

### INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the OMR sheets are strictly prohibited.

ಸೂಕ್ತವಾದ ಉತ್ತರವನ್ನು ಗಮನಿಸಿ ಉತ್ತರಿಸಿ :



1. ಸುಂಕಕ್ಕೆ ಹೆದರಿ ಹರಿದ ಗೋಣಿಯಲ್ಲಿ ----- ತುಂಬಿದ  
a) ರಾಗಿ                      b) ಎಳ್ಳು                      c) ಜೋಳ                      d) ಭತ್ತ.
2. ತೊರೆಯೊಳ್ ----- ದುರಿತ ಪೋಗುವುದೆ.  
a) ಹಾಡಿದರೆ                      b) ಮರೆತರೆ                      c) ಕುಣಿದರೆ                      d) ಮಿಂದರೆ.
3. ಕಣ್ಣಿನ ಕವಡಿಯ ತಣ್ಣನೆ ಜೋಮಾಲೆ -----  
a) ಕಾಲಾಗ ಇತ್ತೋ                      b) ಕೊರಳೊಳಗಿತ್ತೋ                      c) ಕಾಲಲ್ಲಿ ಇಲ್ಲ                      d) ಕೈಯಲ್ಲಿ ಇತ್ತೋ.
4. ಕನ್ನಡದ ಮೊಟ್ಟ ಮೊದಲ ವಚನಗಾರ್ತಿ.  
a) ತ್ರಿವೇಣಿ                      b) ದುಗ್ಗಲೆ                      c) ಆಯ್ತಕ್ಕಿ ಲಕ್ಕಮ್ಮ                      d) ಅಕ್ಕಮಹಾದೇವಿ.
5. ಹೊಸ ಚಿಗುರು ----- ಕೂಡಿರಲು ಮರಸೊಬಗು  
a) ಹೊಸಎಲೆ                      b) ಹೊಸ ಹಸಿರು                      c) ಹೊಸಕಾಂಡ                      d) ಹಳೆಬೇರು.



6. ಭಾಷೆಗೆ ಎಷ್ಟು ಪ್ರಮುಖ ಕೌಶಲ್ಯಗಳಿರುತ್ತವೆ.  
a) 10 b) 4 c) 6 d) 8.
7. ಕುರುಡು ಕಾಂಚಾಣ ಪದ್ಯವನ್ನು ಆಯ್ದು ಕವನ ಸಂಕಲನ -----  
a) ಗರಿ b) ನಾದಲೀಲೆ c) ಸಖಿಗೀತ d) ನಾಕುತಂತಿ.
8. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಯಲ್ಲಿ ವಾಸವಾಗಿರುವ ಜನಾಂಗ  
a) ಗೊಂಡ b) ಕುಣಬಿ c) ಅಲೆಮಾರಿ d) ಕಾಡುಜನ.
9. ಭಾರತವು ಬಟ್ಟೆಯ ಮೇಲಿನ ----- ಕಲೆಗೆ ಮೂಲ ನೆಲೆ.  
a) ಚಿತ್ರ b) ಬಣ್ಣ c) ಮುದ್ರಣ d) ನೇಯ್ಗೆ.
10. ಕ್ರಮ, ಶಿಸ್ತು, ತರ್ಕಬದ್ಧವಾದ ಆಲೋಚನೆ, ನಿಷ್ಕೃಷ್ಟತೆ ಇವು ----- ರವರ ಹುಟ್ಟು ಗುಣಗಳು.  
a) ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ b) ಗಾಂಧೀಜಿ  
c) ಅಕ್ಕಿಹೆಬ್ಬಾಳು ನರಸಿಂಹ ಮೂರ್ತಿ d) ಯಾವುದು ಅಲ್ಲ.
11. "ಚಾಗದ ಭೋಗದಕ್ಕರದಗೇಯದ ಗೊಟ್ಟಿಯಲಂಪಿನಿಂಪುಗಳ್ಗೆ ಆಗರವಾದ ಮಾನಿಸರ್" ಎಂದು ಜೀವನದ ರಸಿಕತೆಯ ಆದರ್ಶವನ್ನು ಸಾರಿದ ಕವಿ.  
a) ರನ್ನ b) ಜನ್ನ c) ಪೂನ್ನ d) ಪಂಪ.
12. ಆಯಾ ರಾಜ್ಯಗಳಲ್ಲಿ ಬಳಕೆಯಾಗುವ ಭಾಷೆ ಆಡಳಿತ ಭಾಷೆಯೆಂದು ತೀರ್ಮಾನಿಸಲಾಗಿರುವ ಅನುಚ್ಛೇದ.  
a) 341ನೇ ಅನುಚ್ಛೇದ b) 342ನೇ ಅನುಚ್ಛೇದ  
c) 343ನೇ ಅನುಚ್ಛೇದ d) 344ನೇ ಅನುಚ್ಛೇದ.
13. ಪರಿಸರ ಪರಂಪರೆ ಹಾಗೂ ಪ್ರತ್ಯಕ್ಷ ಜೀವನದ ಸಂಸ್ಕಾರಗಳ ಮೂಲಕ ಮನುಷ್ಯನ ಅಂತರಂಗ ಪಡೆಯುವ ಪರಿಪಕ್ವತೆಯೇ.  
a) ರೀತಿ b) ನೀತಿ c) ಧರ್ಮ d) ಸಂಸ್ಕೃತಿ.
14. ಆಧುನಿಕ ಕನ್ನಡದ ಮೊಟ್ಟ ಮೊದಲ ಜನಪದ ಸಂಗ್ರಹ ಗ್ರಂಥ.  
a) ಜನಪದ b) ಜಾನಪದ c) ಗರತಿಯ ಹಾಡು d) ಸಾಹಿತ್ಯ.
15. ಬೈಷಜ್ಯ ಪದದ ಅರ್ಥ  
a) ರೋಗಿ b) ರೋಗ c) ಶುಶ್ರೂಷೆ d) ಔಷಧಿ.

16. ರಾಕ್ಷಸ ಪದದ ತದ್ಭವ ರೂಪ  
a) ಕರಾಳ ರೂಪ      b) ರಕ್ತಸ      c) ಹೆದರಿಕೆ      d) ತತ್ಸಮ ರೂಪವಲ್ಲ.
17. ಪರೀಕ್ಷೆ ನಡೆಯುತ್ತಿದೆ ಎನ್ನುವುದು ಯಾವ ಕಾಲ -----  
a) ಭೂತಕಾಲ      b) ಭವಿಷ್ಯತ್ಕಾಲ      c) ವರ್ತಮಾನಕಾಲ      d) ಮಳೆಗಾಲ.
18. ಯಾವ ಜನಾಂಗದ ಚಿತ್ರೀಕರಣ ಲೇಖಕರ ಮನದಲ್ಲಿದೆ?  
a) ನಾಗ      b) ಅಲೆಮಾರಿ      c) ತೊಡವ      d) ಗೊಂಡ. ಜನಾಂಗ.
19. ತಲ್ಲಣಿಸದಿರುಕಂಡ್ಯ ತಾಳು ಮನವೇ ಕೀರ್ತನೆಯ ರಚನೆಕಾರರು.  
a) ಕನಕದಾಸರು      b) ಹರಿದಾಸರು      c) ಪುರಂದರದಾಸರು      d) ದಾಸರು.
20. ಮೆಗಾನ್ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ ಪ್ರಬಂಧವನ್ನು ಯಾವ ಪ್ರವಾಸ ಕಥನದಿಂದ ಆರಿಸಿಕೊಳ್ಳಲಾಗಿದೆ.  
a) ಗಿರಿಜನ      b) ಮೆಗಾನ್  
c) ಗಿರಿಜನ ನಾಡಿಗೆ ಪಯಣ      d) ಆನೆಕಾಡು.
21. ನಗುವು ಸಹಜದ ಧರ್ಮ : ನಗಿಸುವುದು  
a) ಸ್ವಧರ್ಮ      b) ಮನುಷ್ಯಧರ್ಮ      c) ಪರಧರ್ಮ      d) ಕುಲಧರ್ಮ.
22. ಕಾಂಚಾಣ ಗುಡಿಯಲ್ಲಿ ಯಾವ ಶಬ್ದ ಮಾಡುವುದು?  
a) ತನನ      b) ಗಣಣ      c) ರುಣರುಣ      d) ಧಣಧಣ.
23. ವಿಘ್ನವ ಪದದ ಅರ್ಥವೇನು?  
a) ಕ್ರಾಂತಿ      b) ಸ್ವರ್ಗ      c) ಆಟ      d) ಮಾತು.
24. ವಿಶ್ವೇಶ್ವರಯ್ಯನವರ ತವರೂರು ಯಾವುದು?  
a) ಮಂಡ್ಯ      b) ಮೈಸೂರು      c) ಭದ್ರಾವತಿ      d) ಮುದ್ದೇನಹಳ್ಳಿ.
25. ಕನಕದಾಸರ ಮೂಲ ಹೆಸರು -----  
a) ಭರಮಣ್ಣ ನಾಯಕ      b) ಕನಕಪ್ಪ      c) ತಿಮ್ಮಪ್ಪನಾಯಕ      d) ಬೀರಪ್ಪ.

26. ಕಲ್ಲಗಂಜಿ ಕಾಡ ಹೊಕ್ಕಡೆ ----- ತಿಂಬುದ ಮಾಬುದೇ  
 a) ಕಳ್ಳ b) ಹುಲಿ c) ಸರ್ಪ d) ಹುತ್ತ.
27. ಕಾಸಿಂಸಾಬರ ಮಗನ ಹೆಸರು  
 a) ಅಸ್ಲಾಂ b) ಅಶ್ರಫ್ c) ಅಬ್ದುಲ್ d) ಇಸ್ಲಾಮಿಯಲ್.
28. ತಾಳಗುಪ್ಪದ ಗಿರಿಜನ ಆಶ್ರಮ ಶಾಲೆಯ ಮುಖ್ಯೋಪಾಧ್ಯಾಯರು  
 a) ಇಸ್ಲಾಮಿಯಲ್ b) ಕರಿಯ c) ಯಂಕು d) ಹುಚ್ಚಪ್ಪ ಮಾಸ್ತರ.
29. ಕಾಯಕದಲ್ಲಿ ನಿರತನಾದಡೆ ----- ದರ್ಶನವಾದಡೂ ಮರೆಯಬೇಕು.  
 a) ಲಿಂಗ b) ಜಂಗಮ c) ಗುರು d) ಶಿವ.
30. ಹೊಸಬಾಳಿನ ಗೀತೆ ಕವನದ ಕವಿ.  
 a) ಬೇಂದ್ರೆ b) ಡಿವಿಜಿ c) ಕುವೆಂಪು d) ಮಾಸ್ತಿ.
31. ವಿಜಯನಗರ ಕಾಲದಲ್ಲಿ ಧರ್ಮ ಸಮನ್ವಯವನ್ನು ಕಾಪಾಡಿದ ರಾಜ ಯಾರು?  
 a) ಕೃಷ್ಣದೇವರಾಯ b) ಬುಕ್ಕರಾಯ c) ಹಕ್ಕಬುಕ್ಕ d) ದೇವರಾಯ.
32. ಅರಸನಿಗೆ ಗಂಡು ಮಗುವಾದರೆ ----- ಕೊಟ್ಟು ಒಬ್ಬ ಪ್ರಾಣ ಬಿಟ್ಟಿದ್ದುಂಟು.  
 a) ಪ್ರಾಣ b) ಸಿಡಿತಿಲೆ c) ಪ್ರಶಸ್ತಿ d) ಬಹುಮಾನ.
33. ಕರ್ನಾಟಕದ ರಾಜ್ಯ ಭಾಷೆಯನ್ನು ಏನೆಂದು ಘೋಷಿಸಿದೆ?  
 a) ತೆಲುಗು b) ಕನ್ನಡ c) ಹಿಂದಿ d) ಮರಾಠಿ.
34. ವಸುಧೇಂದ್ರ ಅವರು ಬರೆದ ಕಥೆ.  
 a) ಯುಗಾದಿ b) ಶ್ರವಣ c) ಕುರುಡು ಕಾಂಚಾಣ d) ಹೊಸ ಬಾಳಿನ ಗೀತೆ.
35. ಯುಗಾದಿ ಕಥೆಯಲ್ಲಿ ಬರುವ ಪ್ರಹ್ಲಾದ  
 a) ಸಿವಿಲ್ ಇಂಜಿನಿಯರ್ b) ಸಾಪ್ಲೆ ವೇರ್ ಇಂಜಿನಿಯರ್  
 c) ಮೆಕ್ಯಾನಿಕಲ್ ಇಂಜಿನಿಯರ್ d) ಕಥಾನಾಯಕ.

36. 1800 ರಲ್ಲಿ ಬಳ್ಳಾರಿ ಜಿಲ್ಲೆಯ ಕಲೆಕ್ಟರ್ ಆಗಿದ್ದವರು.  
 a) ಡಿ. ಸಿ  
 b) ವಿಜಯಲಕ್ಷ್ಮಿ ಪಂಡಿತ  
 c) ಸರ್ ಥಾಮಸ್ ಮನ್ರೋ  
 d) ಕಮೀಷನರ್ ಆಫ್ ಪೋಲಿಸ್.
37. ಪವಳದ ಲತೆಗೆ ----- ಇಟ್ಟವರು ಯಾರು?  
 a) ಕೇಸರಿ  
 b) ಬಿಳಿ  
 c) ಹಸಿರು  
 d) ಕೆಂಪು.
38. ವಸುಧೆಯೊಳ್ ಶಿಶುನಾಳಧೀಶನ ಮುಂದೆ ಧ್ಯಾನದ ಮಗಿಯೊಂದು ಇಡುವಾಕಿ.  
 a) ಬಳೆಗಾರಕಿ  
 b) ಕುಂಬಾರಕಿ  
 c) ಚಮ್ಮಾರಕಿ  
 d) ಶಿಶುನಾಳ.
39. ಕಬ್ಬಿಗರ ಕಾವ್ಯ ಕೃತಿಯ ಕತೃ ಯಾರು?  
 a) ಆಂಡಯ್ಯ  
 b) ಪಂಪ  
 c) ಬಸವಣ್ಣ  
 d) ಹಂಪನಾ.
40. ಶಶಿ ಪದದ ಅರ್ಥ.  
 a) ಚಂದ್ರ  
 b) ರವಿ  
 c) ಸೂರ್ಯ  
 d) ನಕ್ಷತ್ರ.
41. 86ನೇ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಮ್ಮೇಳನದ ಅಧ್ಯಕ್ಷರಾಗಿದ್ದವರು.  
 a) ಮಹೇಶ್ ಜೋಷಿ  
 b) ಪ್ರೊ. ದೊಡ್ಡರಂಗೇಗೌಡರು  
 c) ಮನು ಬಳೆಗಾರ  
 d) ಯಾವುದು ಅಲ್ಲ.
42. ತೃಷೆ ಪದದ ಅರ್ಥ.  
 a) ನೀರು  
 b) ಬಾಯಾರಿಕೆ  
 c) ತಂಪು  
 d) ಬಿಸಿಲು.
43. ಪ್ರಹ್ಲಾದನ ಹೆಂಡತಿಯ ಹೆಸರೇನು?  
 a) ರೂಪ  
 b) ರೇಖಾ  
 c) ಆರತಿ  
 d) ಭಾರತಿ.
44. ಕರ್ನಾಟಕ ಗತವೈಭವ ಕೃತಿಯನ್ನು ರಚಿಸಿದವರು.  
 a) ಇ.ಪಿ.ರೈಸ್  
 b) ಅಲೂರು ವೆಂಕಟರಾಯರು  
 c) ಬೇಂದ್ರೆ  
 d) ಮಾಸ್ತಿ ವೆಂಕಟೇಶ್ ಅಯ್ಯಂಗಾರ್.
45. ಆರ್ಥಿಕವಾಗಿ ಹಾಗೂ ಸಮಾಜಿಕವಾಗಿ ಕೆಳಸ್ಥರದಲ್ಲಿರುವ ವ್ಯಕ್ತಿಗಳು ಉಳಿಸಿಕೊಂಡು ಬಂದಿರುವ ಸಾಂಪ್ರದಾಯಿಕ ಮೌಲ್ಯಗಳ ತಿರುಳಾಗಿರುವ ಕಥೆಯೇ  
 a) ಯುಗಾದಿ  
 b) ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ  
 c) ಆಮರ ಈಮರ  
 d) ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ.

46. ಕಳವೆ ಪದದ ಅರ್ಥ  
 a) ರಾಗಿ                      b) ಜೋಳ                      c) ಅಕ್ಕಿ                      d) ಭತ್ತ.
47. ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಲಿಪಿಗಳರಾಣಿ ಎಂದು ಕರೆದವರು.  
 a) ಕುವೆಂಪು                      b) ಜನಪದರು                      c) ವಚನಕಾರರು                      d) ವಿನೋಬಾ ಭಾವೆ.
48. 1920ರಲ್ಲಿ ನಾಗಪುರದಲ್ಲಿ ನಡೆದ ಅಧಿವೇಶನ -----.  
 a) ಸಾಹಿತ್ಯ ಅಧಿವೇಶನ                      b) ಕಾಂಗ್ರೆಸ್ ಅಧಿವೇಶನ  
 c) ರಾಜಕೀಯ ಅಧಿವೇಶನ                      d) ಗ್ರಂಥಕರ್ತರ ಅಧಿವೇಶನ.
49. ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಮೊದಲಿನ ಹೆಸರು -----.  
 a) ಮೈಸೂರು ರಾಜ್ಯ                      b) ಮಂಗಳೂರು ರಾಜ್ಯ                      c) ಬೆಂಗಳೂರು ರಾಜ್ಯ                      d) ಯಾವುದು ಅಲ್ಲ.
50. "ಹಸಿವಾದರೆ ಉರೂಳಿಗೆ ಭಿಕ್ಷಾನ್ನಗಳುಂಟು, ತೃಷೆಯಾದರೆ, ಕೆರೆಬಾವಿಹಳ್ಳಗಳುಂಟು, ಶಯನಕ್ಕೆ ಹಾಳು ದೇಗುಲಗಳುಂಟು," ಇದು ಇವರ ವಚನವಾಗಿದೆ.  
 a) ಬಸವಣ್ಣ                      b) ದಾಸಿಮಯ್ಯ                      c) ಅಕ್ಕಮಹಾದೇವಿ                      d) ಮಾರಯ್ಯ.

\* \* \* \* \*

# CBCS SCHEME

21CS382

USN

--	--	--	--	--	--	--	--	--	--

Question Paper Version : D

## Third Semester B.E. Degree Examination, Jan./Feb. 2023 Programming in C++

Time: 1 hr.]

[Max. Marks: 50

### INSTRUCTIONS TO THE CANDIDATES

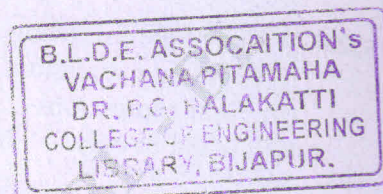
1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

- 
1. Destructor is a member function whose name is as the class name but is preceded by a \_\_\_\_  
a) tilde                      b) hash                      c) dot                      d) dollar
  2. The \_\_\_\_ inherits some or all of the properties of the \_\_\_\_ class.  
a) base, derived              b) derived, base              c) derived, initial              d) base, final
  3. A class can inherit properties from more than one class which is known as \_\_\_\_ inheritance.  
a) single                      b) multiple                      c) multilevel                      d) hierarchical
  4. When the base class is publicly inherited, public members of the base class become \_\_\_\_ of the derived class?  
a) private members              b) public members              c) protected                      d) not inherited
  5. \_\_\_\_ inheritance may lead to duplication of inherited members from a 'grandparent' base class.  
a) multipath                      b) multilevel                      c) hybrid                      d) hierarchical
  6. By default, all the files in C++ are opened in \_\_\_\_ mode.  
a) Binary                      b) Text                      c) ASCII                      d) Numeric

Version D - 1 of 6

7. Which operator is used to create the user-defined streams in C++?  
 a) >>                                      b) <<                                      c) &                                      d) >> & <<
8. What does the cerr represent?  
 a) Standard input stream                                      b) Standard output stream  
 c) Standard error stream with no buffer                                      d) Standard buffer stream
9. Function which reads a character from cin and stores what is read in ch is  
 a) cin . get (ch)                                      b) get (ch)                                      c) cout . put (ch)                                      d) cin . put (ch)
10. Which header file is used for reading and writing to a file?  
 a) # include <iostream>                                      b) # include <fstream>  
 c) # include <file>                                      d) # include <fe>
11. Which of the following approach is used by C++?  
 a) Left-right                                      b) Right-left                                      c) Bottom-up                                      d) Top-down.
12. Object based language differs from object oriented language as it does not support features \_\_\_\_\_.  
 i) Encapsulation                                      ii) Inheritance                                      iii) Dynamic Binding                                      iv) Abstraction  
 a) Only (iii), (iv)                                      b) Only (i), (iii)                                      c) Only (ii), (iv)                                      d) Only (ii), (iii)
13. Who is founder of C++?  
 a) Dennis Ritchie                                      b) Ken Thompson                                      c) Braian Kernighan                                      d) Bjarne Stroustrup.
14. Which of the following features must be supported by any programming language to become a pure object-oriented programming language?  
 a) Inheritance                                      b) Encapsulation                                      c) Polymorphism                                      d) All of the above
15. Identify the user-defined types from the following?  
 a) enumeration                                      b) classes  
 c) int                                      d) both enumeration and classes
16. What is meant by polymorphism in C++?  
 a) Class having only single form                                      b) Class having four forms  
 c) Class having many forms                                      d) Class having two forms
17. Abstract class is the class with no objects created directly.  
 a) True                                      b) False
18. How structures and classes in C++ differ?  
 a) Structures by default hide every member whereas classes do not.  
 b) In structures, members are public by default whereas, in classes, they are private by default.  
 c) Structures cannot have private members classes can have.  
 d) In structures, members are private by default whereas, in classes, they are public by default.

19. What is operator overloading in C++?  
a) Overriding the operator meaning by the user defined meaning for user defined data type.  
b) Redefining the way operator works for user defined types.  
c) Ability to provide the operators with some special meaning for user defined data type.  
d) All of the above.
20. The major goal of inheritance in C++ is  
a) To facilitate the conversion of data types.  
b) To help modular programming.  
c) To facilitate the reusability of code.  
d) To extend the capabilities of a class.
21. Which operator is used to insert the data into file?  
a) >>                      b) <<<                      c) <                      d) >
22. \_\_\_\_\_ is return type of `is_open()` function  
a) int                      b) bool                      c) float                      d) char \*
23. To create an output stream, we must declare the stream to be of class \_\_\_\_\_  
a) ofstream                      b) ifstream                      c) iostream                      d) none of the above
24. What is an exception in C++ program?  
a) a problem that arises during the execution of a program.  
b) A problem that arises during compilation.  
c) Also known as syntax error.  
d) Also known as semantic error.
25. Out of range index and overflow is \_\_\_\_\_ exception.  
a) Asynchronous                      b) Synchronous                      c) Both                      d) None of the above
26. Keyboard interrupts are Asynchronous exceptions  
a) True                      b) False
27. What is the difference between error and exception?  
a) Both are same.  
b) Both can be handled during runtime.  
c) Exceptions can be handled at the runtime but the errors cannot.  
d) Errors can be handled at the runtime but the exceptions cannot.
28. What is Rethrowing an exception means in C++?  
a) An exception that is thrown again as it is not handled by that catching block.  
b) An exception that is caught twice.  
c) An exception that is not handled in one caught hence thrown again.  
d) All of the above.
29. Which of the following is an exception in C++?  
a) Divide by zero                      b) Semicolon not written  
c) Variable not declared                      d) An expression is wrongly written





30. Throw statement can be used by the \_\_\_\_\_ forms:  
 a) throw (exception) ;                      b) throw exception ;  
 c) throw    d) All of the above.
31. The \_\_\_\_\_ manipulator is used in an output statement which causes a linefeed to be inserted.  
 a) setw    b) delete    c) endl    d) symbol
32. Which of the following are the types of C++ expressions:  
 i) Constant expressions                      ii) Integral expressions  
 iii) Float expressions                              iv) Null expressions  
 a) i, ii and iii only                      b) ii, iii and iv only                      c) i, ii and iv only                      d) All of the above
33. \_\_\_\_\_ combine to or more relational expressions and produces bool type results.  
 a) relational    b) float    c) logical    d) bitwise
34. The operator \_\_\_\_\_ is known as a compound assignment or short-hand assignment operator.  
 a) ==    b) =    c) +=    d) + ==
35. The following is \_\_\_\_\_ expressions  $x = y = z = 10$   
 a) Embedded assignment    b) Logical assignment  
 c) Chained assignment    d) Compound assignment
36. Constructor has the same \_\_\_\_\_ as that of the class.  
 a) Variable    b) Object    c) Function    d) Name
37. What will be the output of the following C++ code?  

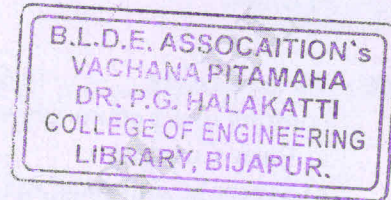
```
#include <iostream>
using namespace std;
void swap (int &a, int &b)
{
    int temp;
    temp = a;
    a = b;
    b = temp;
}
int main( )
{
    int a = 5, b = 10;
    swap (a, b);
    cout << "In main" << a << b;
    return 0;
}
```

 a) In main 10 5                      b) In main 5 10                      c) Error    d) No output
38. A constructor that accepts no parameters is called \_\_\_\_\_  
 a) default constructor    b) parameterized  
 c) implicit constructor    d) null constructor

39. Constructors cannot be inherited, through a derived class can call the \_\_\_\_\_ constructor.  
 a) base class                      b) derived class                      c) void class                      d) default class
40. What will be the output of the following C++ code?  

```
#include <iostream>
using namespace std;
int main()
{
    int a = 9;
    int & aref = a;
    a++;
    cout << "The value of a is" << aref;
    return 0;
}
```

 a) 9                      b) 10                      c) error                      d) 11
41. The class where objects behave like a data type, which is known as \_\_\_\_\_  
 a) Method data type                      b) Message data type  
 c) User defined data type                      d) Abstract data type.
42. Single class may have multiple objects associated with it  
 a) True                      b) False
43. Operators such as \_\_\_\_\_ cannot be overloaded  
 a) +                      b) ++                      c) ::                      d) ==
44. The function that can access and manipulate the private entities of class  
 a) Abstract class                      b) Method class  
 c) User defined class                      d) Friend function
45. \_\_\_\_\_ are explicitly reserved identifiers and cannot be used as names for the program variables or other user-defined elements.  
 a) Keywords                      b) Identifiers  
 c) Constants                      d) Strings
46. State whether the following statements are true or false for C++ identifiers:  
 i) Only alphabetic characters, digits and underscores are permitted.  
 ii) The name can start with a digit.  
 iii) Uppercase and lowercase letters are distinct  
 a) i – True, ii – True, iii – False                      b) i – True, ii – False, iii – True  
 c) i – True, ii – False, iii – False                      d) i – True, ii – True, iii – True.



47. The binding of data and functions together into a single class type variable is referred to as \_\_\_\_\_  
a) Encapsulation      b) Polymorphism      c) Inheritance      d) Overloading
48. Which of the following is not the user defined data type in C++?  
a) Structure      b) Pointer  
c) Union      d) Class
49. We can create \_\_\_\_\_ in C++ using the qualifier constant and defining a set of integer constant using enum keywords.  
a) Basic Constant      b) Number constant  
c) Symbolic constant      d) Named constant
50. Which of the following is the scope resolution operator in C++  
a) ::      b) :: \*  
c) > \*      d) . \*

\* \* \* \* \*

USN

--	--	--	--	--	--	--	--	--	--

Question Paper Version : D

**Third Semester B.E. /B.Tech. Degree Examination, Jan./Feb. 2023**  
**CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS**

[Time: 1 hrs.]

[Max. Marks: 50]

### INSTRUCTIONS TO THE CANDIDATES

1. Answer all the Fifty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

- 
1. The Election of the President is by a system of proportional representation by means of
    - a) Valid Transferable Vote
    - b) Transferable Vote
    - c) Single Transferable Vote
    - d) Legally Transferable Vote
  2. When a Financial emergency is proclaimed
    - a) Union budget will not be presented
    - b) Salaries and allowances of any class of Employees may be reduced.
    - c) Repayment of Government debts will stop
    - d) Payment of Salaries to Public servants will be postponed.
  3. This is not a ground to declare National emergency
    - a) War
    - b) Hung Legislature
    - c) Armed Rebellion
    - d) Failure of the Government
  4. Who appoints the Election Commissioner
    - a) Prime Minister
    - b) Parliament
    - c) President
    - d) None of these
  5. Proclamation of Emergency declared under Article 352 must be approved by the Parliament within
    - a) 1 Year
    - b) Six months
    - c) 1 month
    - d) 15 days
  6. The control of the preparation of Electoral rolls for Parliament and State Legislature Elections rests with the
    - a) President
    - b) Election Commission
    - c) Cabinet
    - d) Prime Minister
  7. Who appoints the Chairman for UPSC?
    - a) Prime Minister
    - b) Parliament
    - c) Supreme Court
    - d) President
  8. Who is the Ex – officio Chairman of the Council of States?
    - a) Vice president
    - b) Speaker
    - c) Prime Minister
    - d) President

9. State emergency is declared on the written recommendation of :  
 a) Chief Minister      b) Governor      c) High Court Justice      d) Assembly
10. How many types of Emergencies have been mentioned in the Constitution of India?  
 a) Four      b) Three      c) One      d) Two
11. The idea of the Constitution of India was flashed for the first time by  
 a) Dr. B.R. Ambedkar      b) Dr. Rajendra Prasad  
 c) Mahatma Gandhiji      d) Jawaharlal Nehru
12. The Indian Constitution came into force on  
 a) 26.11.1949      b) 26.01.1950      c) 15.08.1947      d) 26.12.1950
13. The preamble of the Constitution of India has been amended so far  
 a) Four times      b) Thrice      c) Twice      d) Once
14. Article 20 of the Indian Constitution refers to  
 a) Freedom of Speech      b) Right to Equality  
 c) Individual is Personal liberty      d) Abolition of Titles
15. Who interprets the Indian Constitution?  
 a) Supreme Court      b) Parliament      c) President      d) Prime Minister
16. Under the Constitution, the subjects of Administration have been divided into  
 a) Two lists      b) Four lists      c) Five lists      d) Three lists
17. Which is the lengthiest Amendment to the Indian Constitution?  
 a) 46<sup>th</sup>      b) 44<sup>th</sup>      c) 42<sup>nd</sup>      d) 24<sup>th</sup>
18. Which of these are the salient features of Indian Constitution?  
 a) Secularistic in Nature      b) Federal cum Unitary  
 c) Only 'a'      d) Both 'a' and 'b'
19. The concept of Fundamental Duties are mentioned under :  
 a) Part II of the Constitution      b) Part III of the Constitution  
 c) Part IVA of the Constitution      d) Part V of the Constitution
20. Who among the following described the 'Preamble' as the "Horoscope of Indian Constitution".  
 a) Mahatma Gandhiji      b) J.J. Nehru      c) K.M. Munshi      d) Sardar Patel
21. One of the characteristic of Profession is  
 a) Monopoly      b) Hard work      c) Competition      d) Money Minded
22. The term ethics is derived from  
 a) Ethical in English      b) Ethic in Latin      c) Ethics in Greek      d) French
23. Intellectual property is protected through  
 a) The Patents , Trade mark and Copyrights      b) Company Documentation  
 c) Storage in Computers      d) Security Personnel
24. Engineers first obligation is towards  
 a) His Employer      b) Public safety      c) Government      d) Clients

25. The codes of Ethics can be taken as guidelines by the Engineers to  
 a) Resolve the conflicts                      b) Formulate the problems  
 c) Overcome the work pressure              d) Escape from the responsibility
26. Corrupt Professional Judgment leads to  
 a) Integrity in R & D    b) Conflicts of Interests    c) Reliability                      d) None of these
27. Engineers will serve society better, if they are informed about  
 a) Morality and code of conduct            b) Technical standards  
 c) Standards of Science                      d) Litigation process
28. Which of the following is not preserved as an Intellectual property?  
 a) Government Regulations                  b) Patents  
 c) Copyrights                                      d) Trade Secrets
29. Which of these is a factor that affects ethical and unethical behavior?  
 a) Diversity        b) Ethical dilemma        c) Team work                      d) Honesty
30. This is not the aim of studying Engineering Ethics  
 a) Developing Ethics                            b) Natural Ethics  
 c) Scientifically Developed Ethics          d) Preventive Ethics
31. Who among the following is directly responsible to Parliament for all matters concerning the defense services of India?  
 a) President                                      b) Cabinet Committee on Political Affairs  
 c) Prime Minister                                d) Defence Minister
32. Who among the following can attend meetings of the Union Cabinet?  
 a) President                                      b) Cabinet Ministers  
 c) Ministers of State                          d) Deputy Ministers
33. Who acts as the President of India when neither the President nor the Vice President is available?  
 a) Senior most Governor of a State        b) Chief Justice of India  
 c) Speaker of Lok Sabha                      d) Auditor General of India
34. Who among the following holds office during the pleasure of President?  
 a) Governor                                      b) Election Commissioner  
 c) Speaker                                        d) Prime Minister
35. If the President wants to resign from office, he may do so by writing to the  
 a) Chief Justice of India                        b) Speaker of Lok Sabha  
 c) Prime Minister                                d) Vice - President
36. The Union Council of Ministers is appointed by the  
 a) President of India according to his discretion  
 b) President of India on the advice of the Prime Minister  
 c) Prime Minister of India                      d) Parliament
37. The Union Council of Ministers is collectively responsible to  
 a) Rajya Sabha                                    b) President  
 c) House of the People                        d) Prime Minister
38. Who can initiate impeachment proceedings against the President of India.  
 a) Either House of Parliament              b) Any Vidhan Sabha  
 c) Only Lok Sabha                              d) Rajya Sabha

39. The total number of members nominated by the President to the Parliament are :  
 a) 16                                      b) 14                                      c) 18                                      d) 21
40. The Chairman of the Planning Commission in India is the  
 a) President                                      b) Prime Minister  
 c) Minister of Planning                                      d) Finance Minister
41. The source of India's Sovereignty lies in the  
 a) People of India    b) Supreme Court    c) President                                      d) Prime Minister
42. The Directive Principle of State Policy are  
 a) Justiciable                                      b) Non Justiciable  
 c) Only some Directive Principles are Justiciable  
 d) None of these.
43. Which is not a Fundamental Right?  
 a) Right to Freedom                                      b) Right to Constitutional remedies  
 c) Right to Property                                      d) Right to Equality
44. Directive principles of State Policy have been described under the Article of :  
 a) 36 to 51                                      b) 1 to 11                                      c) 12 to 35                                      d) 19 to 27
45. Which one of the following is not a Fundamental duty?  
 a) To protect and improve natural Environment.  
 b) To develop Scientific temper  
 c) To abide by the Constitution.  
 d) To serve a Uniform civil code applicable to the entire Country.
46. Directive principles of the State policies were incorporated in the Constitution with a view to  
 a) Ensure a Democratic Government in the Country  
 b) Provide a strong Central Government  
 c) Establish Welfare state  
 d) Raise the Living Standards of the weaker sections of the Society.
47. The Constitution of India was formed by the Constituent Assembly under :  
 a) August offer of 1940                                      b) Cripps proposal of 1942  
 c) The Cabinet Mission Plan of 1946                                      d) Simon Commission of 1942
48. The Fundamental Rights granted by the Constitution of India to its Citizens cannot be suspended  
 a) Except by the order of the Supreme Court  
 b) Under any circumstances  
 c) Except by an order of the President during National Emergency  
 d) Except through an order of the President during War.
49. Right to Constitutional remedies is guaranteed under :  
 a) Article 21                                      b) Article 32                                      c) Article 30                                      d) Article 25
50. Which of these are Gandhian Principle?  
 a) Equal pay for equal work                                      b) Prohibition of Cow slaughter  
 c) Respecting and Promoting Socialism and Democracy  
 d) Both b and c.

# CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

21MAT31

## Third Semester B.E. Degree Examination, Jan./Feb. 2023 Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Find the Laplace transform of

$$te^{2t} - \frac{2\sin 3t}{t}$$

B.L.D.E. ASSOCIATION'S  
VACHANA PITAMAH  
DR. P.G. HALAKATTI  
COLLEGE OF ENGINEERING  
LIBRARY, BIJAPUR.

(06 Marks)

- b. Given that  $f(t) = \begin{cases} E, & 0 < t < \frac{a}{2} \\ -E, & \frac{a}{2} < t < a \end{cases}$

where  $f(t+a) = f(t)$  show that  $L\{f(t)\} = \frac{E}{s} \tan h\left(\frac{as}{4}\right)$ .

(07 Marks)

- c. Using convolution theorem obtain the inverse Laplace transform of the following function :

$$\frac{1}{(s-1)(s^2+1)}$$

(07 Marks)

OR

- 2 a. Find the inverse Laplace transform of :

$$\frac{s+5}{s^2-6s+13}$$

(06 Marks)

- b. Express the following function in terms of unit step function and hence find their Laplace transform.

$$f(t) = \begin{cases} 1, & 0 < t < 1 \\ t, & 1 < t \leq 2 \\ t^2, & t > 2. \end{cases}$$

(07 Marks)

- c. Solve the following initial value problem by using Laplace transform :

$$\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}, \quad y(0) = 0, \quad y'(0) = 0.$$

(07 Marks)

### Module-2

- 3 a. Obtain Fourier series of  $f(x) = \frac{\pi-x}{2}$  in  $0 < x < 2\pi$ . Hence deduce that

$$1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}$$

(06 Marks)

- b. Find a cosine Fourier series for  $f(x) = (x-1)^2, 0 \leq x \leq 1$ .

(07 Marks)

- c. Obtain the Fourier series of  $y$  upto the First harmonic for the following values.

x°	45	90	135	180	225	270	315	360
y	4.0	3.8	2.4	2.0	-1.5	0	2.8	3.4

(07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.



OR

- 8 a. Solve the elliptic equation  $u_{xx} + u_{yy} = 0$  for the following square Mesh with boundary values as shown. Find the iterative values of  $u_i$  (1 to 9) to the nearest integer.

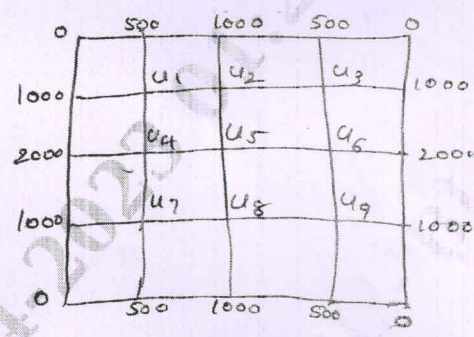


Fig.Q8(a)

(10 Marks)

- b. Solve  $25u_{xx} = u_{tt}$  at the pivotal points given  $u(0, t) = 0 = u(5, t)$ ,  $u_t(x, 0) = 0$  and  $u(x, 0) = \begin{cases} 20x, & 0 \leq x \leq 1 \\ 5(5-x), & 1 \leq x \leq 5 \end{cases}$  by taking  $h = 1$  compute  $u(x, t)$  for  $0 \leq t \leq 1$ .

(10 Marks)

Module-5

- 9 a. Given  $y'' - xy' - y = 0$  with the initial conditions  $y(0) = 1$ ,  $y'(0) = 0$  compute  $y(0.2)$  using fourth order Runge - Kutta method. (06 Marks)  
 b. Derive the Euler's equation. (07 Marks)  
 c. Find the extremal of the functional.

$$\int_{x_1}^{x_2} (y^2 + y'^2 + 2ye^x) dx .$$

(07 Marks)

OR

- 10 a. Obtain the solution of the equation  $2 \frac{d^2y}{dx^2} = 4x + \frac{dy}{dx}$  by computing the value of  $y(1.4)$  by applying Milne's method using following data :

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514
y'	2	2.3178	2.6725	3.0657

(06 Marks)

- b. Find the curve on which the functional  $\int_0^1 [(y')^2 + 12xy] dx$  with  $y(0) = 0$  and  $y(1) = 1$  can be determined. (07 Marks)  
 c. Prove that the shortest distance between two points in a plane is straight line. (07 Marks)

\*\*\*\*\*

OR

- 4 a. Obtain Fourier series for

$$f(x) = \begin{cases} \pi x & \text{in } 0 \leq x \leq 1 \\ \pi(2-x) & \text{in } 1 \leq x \leq 2 \end{cases}$$

(06 Marks)

- b. Obtain the sine half range series for the function :

$$f(x) = 1 - \left(\frac{x}{\pi}\right) \text{ in } 0 \leq x \leq \pi.$$

(07 Marks)

- c. The following values of y and x are given. Find Fourier series of upto first harmonics.

x	0	2	4	6	8	10	12
y	9.0	18.2	24.4	27.8	27.5	22.0	9.0

(07 Marks)

Module-3

- 5 a. If
- $f(x) = \begin{cases} 1-x^2, & |x| < 1 \\ 0, & |x| \geq 1 \end{cases}$
- . Find Fourier transform of f(x) and hence find the value of

$$\int_0^{\infty} \frac{x \cos x - \sin x}{x^3} dx.$$

(06 Marks)

- b. Find the Fourier sine transform of
- $f(x) = e^{-|x|}$
- and hence evaluate

$$\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx, \quad m > 0.$$

(07 Marks)

- c. Solve by using Z-Transforms
- $U_{n+2} + 2U_{n+1} + U_n = n$
- with
- $U_0 = 0 = U_1$
- .

(07 Marks)

OR

- 6 a. Obtain the Fourier cosine transform of the function :

$$f(x) = \begin{cases} 4x, & 0 < x < 1 \\ 4-x, & 1 < x \leq 4 \\ 0, & x > 4. \end{cases}$$

(06 Marks)

- b. Obtain the Z-transform of
- $\cos n\theta$
- and
- $\sin n\theta$

(07 Marks)

- c. Compute the inverse Z-transform of
- $\frac{3z^2 + 2z}{(5z+1)(5z+2)}$
- .

(07 Marks)

Module-4

- 7 a. Classify the following partial differential equations :

i)  $x^2 u_{xx} + (1-y^2) u_{yy} = 0, \quad -\infty < x < \infty, \quad -1 < y < 1$

ii)  $(1+x^2) u_{xx} + (5+2x^2) u_{xt} + (4+x^2) u_{tt} = 0$

iii)  $(x+1) u_{xx} - 2(x+2) u_{xy} + (x+3) u_{yy} = 0.$

(10 Marks)

- b. Solve
- $u_t = u_{xx}$
- subject to the conditions
- $u(0, t) = 0 = u(1, t)$
- and
- $u(x, 0) = \sin(\pi x)$
- by taking
- $h = 0.2$
- for 5 levels. Further write down the following values from the table

i)  $u(0.2, 0.04)$

ii)  $u(0.4, 0.08)$

iii)  $u(0.6, 0.06).$

(10 Marks)