

COURSE NAME : DISCRETE MATHEMATICS

Time Allowed: 03:00 hrs

Max. Marks: 70

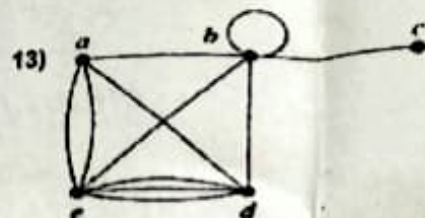
Read the following instructions carefully before attempting the question paper.

1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.
2. This question paper is divided into two parts A and B.
3. Part A contains 20 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.
4. Part B contains 5 questions of 10 marks each. In each question attempt either question (a) or (b), in case both (a) and (b) questions are attempted for any question then only the first attempted question will be evaluated.
5. Attempt all the questions in serial order.
6. Do not write or mark anything on the question paper except your registration no. on the designated space.
7. After completion of first 45 minutes, the OMR sheet will be taken by the invigilator.
8. Submit the question paper and the rough sheet(s) along with the answer sheet to the invigilator before leaving the examination hall.

PART A

Q1.

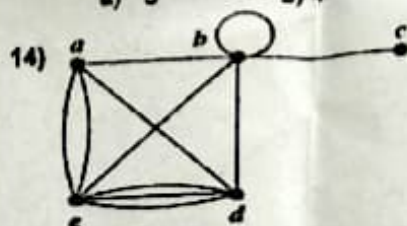
- 1) The value of $\Delta^3(x^4 + 5x^3 - 6x + 10)$ is
a) 24 b) 120 c) 0 d) 4
- 2) The value of $\Delta(2x+1)^2$, with $h=1$, is
a) $(x+2)$ b) $4(x+2)$ c) $4(x+1)$ d) (x^2+2)
- 3) The value of $\Delta^2 E^3 x$ is
a) 5 b) 6 c) 0 d) 1
- 4) The functions $2^k \sin k\theta$, $2^k \cos k\theta$ are linearly independent, if
a) $\theta = n\pi, n \in \mathbb{Z}$ b) $\theta \neq n\pi, n \in \mathbb{Z}$ c) $\theta = 2n\pi, n \in \mathbb{Z}$ d) $\theta = n\pi/2, n \in \mathbb{Z}$
- 5) The particular solution of the difference equation $y_{n+2} - 4y_{n+1} + 4y_n = 0$ such that $y_0 = 1$ and $y_1 = 3$ is
a. $2^k(1 + \frac{k}{2})$ b. $2^k(1 - \frac{k}{2})$ c. 2^k d. $2^k(2 + \frac{k}{2})$
- 6) According to method of undetermined coefficients, the trial solution for $R(k) = \beta^k$ is
a. $A\beta^k$ b. $(A+B)\beta^k$ c. $(A-B)\beta^k$ d. $(AB)\beta^k$
- 7) According to method of undetermined coefficients, the trial solution for $R(k) = \sin ak$ is
a. $A \sin ak$ b. $A \cos ak + B \sin ak$ c. $A \cos ak$ d. $A^2 \cos ak - B^2 \sin ak$
- 8) According to method of undetermined coefficients, the trial solution for polynomial $P(k)$ of degree 2 is
a. $A_0 k^2 + A_1 k + A_2$ b. $A_0 k^2 + A_1$ c. $A_0 k^2$ d. $A_0 k + A_1$
- 9) Let $A = \{1, 2, 3, 4, 6\}$. Let R be the relation on A define by $\{(a, b) : a \in A, b \in A, a \text{ divides } b\}$. Range of R is
a. $\{1, 2, 3, 4, 6\}$ b. $\{1, 3, 4, 6\}$ c. $\{1, 2, 3, 6\}$ d. \emptyset
- 10) Let $A = \{x, y\}$ and $B = \{1, 2\}$. Find the number of relations from A into B .
a. 16 b. 32 c. 64 d. 128
- 11) Let $A = \{1, 2, 3, 4\}$. Let R be the relation on A define by $\{(a, b) : a \in A, b \in A, a < b\}$. Which of the following is false
a. R is not reflexive b. R is transitive c. R is transitive but not reflexive d. R is equivalence relation
- 12) The 'Subset' relation on set of sets is
a. A partial ordering b. An equivalence relation
c. Transitive and symmetric only d. Transitive and anti-symmetric only



H

Degree of a vertex 'e' in graph H is

- a) 5 b) 4 c) 6 d) 7



H

The vertex b is adjacent to

- a) b, e, d b) b, c, d, e c) a, b, c, d, e d) c, e, d

15) Number of edges in W_4 is

- a) 4 b) 5 c) 7 d) 8

16) The numbers of leaves in a full 3-ary tree with 10 vertices are

- (a) 27 (b) 21 (c) 7 (d) none of these

17) The level of root is

- (a) 1 (b) 0 (c) Cannot be determined (d) None of the

18) In a rooted tree, the length of the longest path from the root to any vertex is called

- (a) Height (b) Level (c) Both (a) and (b) (d) None of

19) The secret message produced from the message "ARE" using $f(p) = (p+3) \bmod 26$

- (a) DUH (b) DHU (c) UDH (d) HUD

20) The secret message produced from the message "HEN" using $f(p) = (p+3) \bmod 26$

- (a) KHQ (b) HKQ (c) KQH (d) QKH

PART B

Q2 a) Solve the difference equation $f(x+2h) - 10f(x+h) + 25f(x) = 0$ for $y_0 = 3, y_1 = 1$ [10 Marks]

OR

b) i) Find the solution of $y_{k+2} - 9y_k = 0$ such that $y_0 = 2, y_1 = -1$ [5 Marks]

ii) Determine whether $2^k, 2^{2k}, 2^{3k}$ are linearly independent or linearly dependent. [5 Marks]

Q3 a) Solve $y_{k+3} + y_{k+2} - y_{k+1} - y_k = 0$ and find solution which satisfies the condition $y_0 = 2, y_1 = -1, y_2 = 1$ [10 Marks]

OR

b) i) Solve $y_{k+2} - 3y_{k+1} + 2y_k = 4^k$ [5 Marks]

ii) Solve $y_{k+3} - 2y_{k+2} - 5y_{k+1} + 6y_k = 5 \cdot 2^k - 6 \cdot 3^k$ [5 Marks]

Q4 a) Check the following graphs are isomorphic or not



OR

[10 Marks]

