

This question paper contains 4 printed pages]

Roll No.

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

S. No. of Question Paper : 386

Unique Paper Code : 235381

C

Name of the Paper : CH-3.5—Mathematics

Name of the Course : B.Com. (Hons.)

Semester : III

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt all the questions as per the directions questionwise.

1. Attempt any four parts :

(a) Find the equation of a line which passes through the point (4, 2) and moves in the direction (1, 1) in the parametric form. Transform it into slope and intercept form. 6

(b) Determine whether the set of vectors :

$$S = \{(1, 3), (-2, 6)\}$$

form a basis for R^2 ?

6

(c) Let $T : R^3 \rightarrow R^2$ be a linear transformation for which $T(1, 0, 0) = (2, -1)$, $T(0, 1, 1) = (1, 1)$, $T(1, 1, 0) = (-1, 4)$. Find $T(2, -1, 1)$. 6

(d) Find a unit vector in the direction of the vector $(-1, 2, -3)$. 6

(e) Find the point-normal equation of a plane which contains the points :

$$(2, 1, 1), (1, 0, -3), (0, 1, 7).$$

6

P.T.O.

2. Attempt any *four* parts :

(a) Find the first five terms of the following inductively defined sequences : 6

(i) $Z_1 = 1, Z_2 = 2, Z_{n+2} = (Z_{n+1} + Z_n)/(Z_{n+1} - Z_n)$

(ii) $S_1 = 3, S_2 = 5, S_{n+2} = S_n + S_{n+1}$

(b) Find the general term for the following sequences : 6

(i) $(\sqrt{2} - \sqrt{3}), (\sqrt{3} - \sqrt{4}), (\sqrt{4} - \sqrt{5}) \dots\dots\dots$

(ii) $1/2, 3/4, 5/6, 7/8 \dots\dots\dots$

(iii) $3/2, 5/9, 7/28, 9/65 \dots\dots\dots$

(c) Define supremum and infimum. If

(i) $A = \{-1, 2, -3, 4, \dots\dots\dots (-1)^n \cdot n \dots\dots\dots\}$

(ii) $B = \{2, 3/2, 4/3, \dots\dots\dots (n+1)/n\}$

(iii) $C = \{(4n+3)/n : n \in \mathbb{N}\}$

Where \mathbb{N} is the set of natural number. Find the supremum and infimum of the above sets, if they exists. 6

(d) Show that the series $1 + r + r^2 + \dots\dots\dots (r > 0)$ converges if $r < 1$ and diverges if $r \geq 1$. 6

(e) Test the following series for convergence or divergence : 6

(i) $\sum_{n=1}^{\infty} 1/\sqrt{n} !$

(ii) $\sum_{n=1}^{\infty} \frac{[\sqrt{(n+1)} - \sqrt{(n-1)}]}{n}$

3. Attempt any *two* parts :

(a) Write the general forms of the following statements of the SPARKS : 4

(i) While

(ii) Repeat until

(iii) if then else

(iv) for

(b) Find the greatest common divisor of 414 and 662. 4

(c) Define 'Big oh' notation. Show that : 4

$$f(n) = 2n^7 - 6n^5 + 10n^2 - 5 = O(n^7).$$

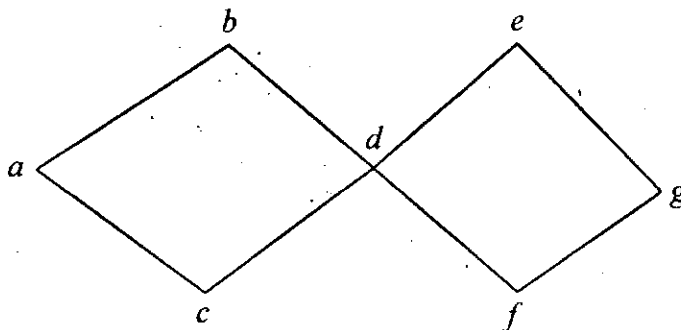
4. Attempt any *three* parts :

(a) What do you mean by Konigsberg Bridge problem ? Explain it. 4

(b) Find the graph represented by the following incidence matrix :- 4

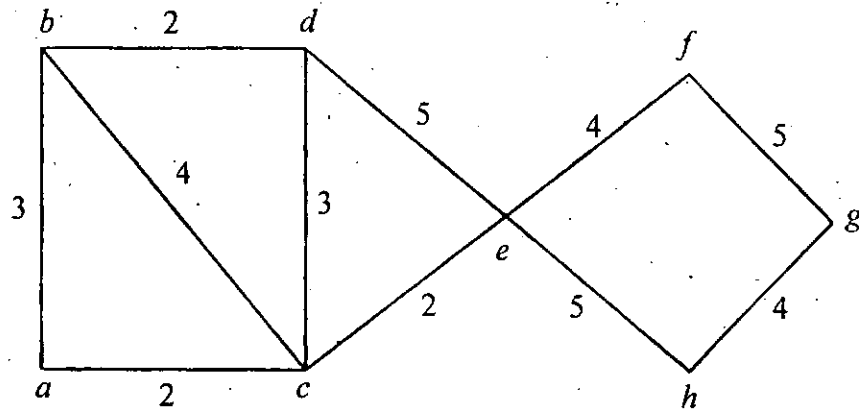
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |

(c) Use Breadth-first-search algorithm to find a spanning tree for the graph : 4



- (d) Find a minimal spanning tree for the following graph :

4



5. Attempt any *two* parts :

- (a) Define the following terms :

3.5

(i) Competitive game

(ii) Zero sum game.

- (b) Two players A and B match coins. If the coins match, then A wins 2 units of value, if the coins do not match, then B wins 2 units of value. Determine the optimum strategies for the players and the value of the game.

3.5

- (c) Solve the following game using the notion of dominance :

3.5

| | | B | | | |
|---|-----|---|----|-----|----|
| | | I | II | III | IV |
| A | I | 3 | 2 | 4 | 0 |
| | II | 3 | 4 | 2 | 4 |
| | III | 4 | 2 | 4 | 0 |
| | IV | 0 | 4 | 0 | 8 |