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*) $(\sqrt{2} - \sqrt{3}), (\sqrt{3} - \sqrt{4}), (\sqrt{4} - \sqrt{5})$ ....

(*ii*) 1/2, 3/4, 5/6, 7/8 ....

(*iii*) 3/2, 5/9, 7/28, 9/65 ....

(*c*) Define supremum and infimum. If

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

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

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

Where 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 $1 + r + r^2 + \ldots\ldots\ldots\ldots (r > 0)$ 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*) $\sum_{n=1}^{\infty} \frac{\left[\sqrt{(n+1)} - \sqrt{(n-1)}\right]}{n}$.

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 :

$$f(n) = 2n^7 - 6n^5 + 10n^2 - 5 = O(n^7).$$ 4

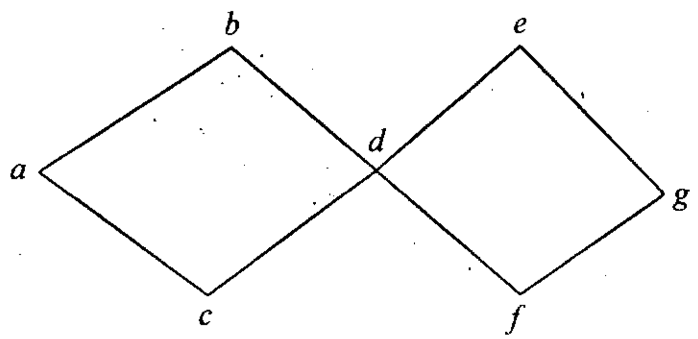
4. Attempt any *three* parts :

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

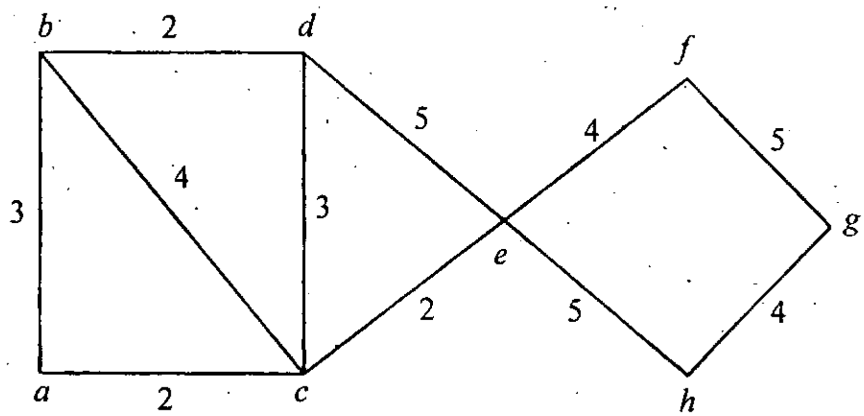
(*b*) Find the graph represented by the following incidence matrix :- 4

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