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Your Roll No.....

6158

**B.Com. (Hons.)/II                      B**

**Paper XV—MATHEMATICS**

*Time : 2 Hours*

*Maximum Marks : 50*

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

*Note :—* The maximum marks printed on the question paper are applicable for the candidates registered with the School of Open Learning for the B.Com.(Hons.) These marks will, however, be scaled down proportionately in respect of the students of regular colleges, at the time of posting of awards for compilation of result.

*All questions are compulsory.*

I. Attempt any *three* parts :

- (a) Find the equation of a line which passes through the point  $(-1, 3, 7)$  and moves in the direction  $(5, -1, -8)$  in symmetric form. 5

P.T.O.

- (b) Determine whether the set of vectors :

$$s = \{(1, 1), (1, 2)\}$$

forms a basis for  $\mathbf{R}^2$  ? 5

- (c) Find the standard matrix for the linear transformation

$T : \mathbf{R}^3 \rightarrow \mathbf{R}^3$  defined by : 5

$$T(x, y, z) = (y, z, x).$$

- (d) Find the characteristic equation of the matrix : 5

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & -4 & 2 \\ 0 & 0 & 7 \end{bmatrix}$$

2. Attempt any *three* parts :

- (a) Find the general term of the following sequences : 5

(i)  $\frac{2}{5}, \frac{4}{11}, \frac{6}{17}, \frac{8}{23}, \dots$

(ii)  $\frac{-1}{4}, \frac{1}{7}, \frac{-1}{10}, \frac{1}{13}, \dots$

- (b) Find the limit of the sequence  $\left\{ \frac{n!}{n^n} \right\}_{n=1}^{\infty}$  using Sandwich

theorem.

- (c) Using comparison test, determine whether the following series converge : 5

$$\sum_{n=1}^{\infty} \frac{(2n-1)^n}{n(n+1)(n+2)}$$

- (d) Test the convergence of the series : 5

$$\sum_{n=1}^{\infty} \frac{n^2 - 1}{n^2 + 1} x^n, \quad x > 0$$

3. Attempt any two parts :

- (a) Define Fibonacci numbers. Write a 'SPARKS' program to print the value of the  $n$ th Fibonacci value  $f_n$  3½

- (b) Find the greatest common divisor of the pair :

$$(30, 75). \quad 3\frac{1}{2}$$

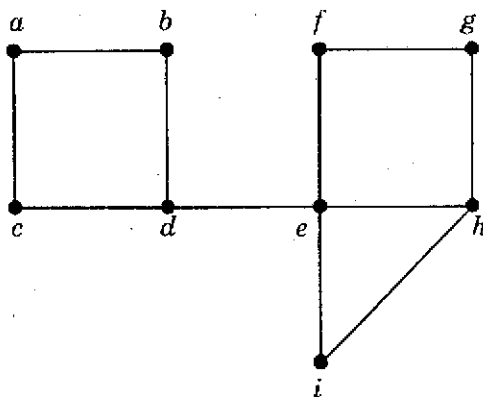
- (c) Show that  $f(n) = 2n^7 - 6n^5 + 10n^2 - 5$  is 'big oh' of  $n^7$ . 3½

4. Attempt any two parts :

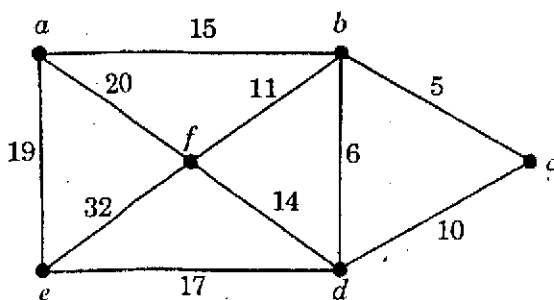
- (a) Find the graph for the following adjacency matrix : 4

$$\begin{bmatrix} 0 & 3 & 0 & 2 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 1 & 2 \\ 2 & 1 & 2 & 0 \end{bmatrix}$$

- (b) Find all the spanning trees for the graph : 4



- (c) Find a minimum cost spanning tree for the following graph : 4



5. In a game of matching coins with two players, suppose A wins one unit of value when there are two heads, wins

nothing when there are two tails and loses  $\frac{1}{2}$  unit of value when there are one head and one tail. Determine the pay-off matrix, the best strategies for each player, and the value of the game to A. 5

*Or*

Solve the following game using the notion of dominance : 5

		<b>Player B</b>		
		I	II	III
<b>Player A</b>	I	-1	-2	8
	II	7	5	-1
	III	6	0	12