1667   *Your Roll No.* ....

B.Com. (Hons.) / II   A

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.*

1.   Attempt any **three** parts :

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

   (b) Determine whether the set of vectors $S = \{(2, 1),
   (-4, -2)\}$ forms a basis of $\mathbb{R}^2$?   (5)

   (c) Let $T : \mathbb{R}^3 \to \mathbb{R}^2$ 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 $T(2, -1, 1)$.   (5)

   (d) Find the standard matrix if T is a projection onto
   y-axis.   (5)

P.T.O.

2. Attempt any **three** parts :

   (a) Find first five terms of the following sequence which is inductively defined as

   $$a_1 = -2 \qquad a_{n+1} = n\frac{a_n}{n+1}.$$ (5)

   (b) Determine whether the following sequences converge or diverge ?

   (i) $\left\{(-1)^{n+1} \dfrac{n}{2^{n+i}}\right\}_{n=1}^{\infty}$

   (ii) $1, 2, 2^3, 2^3 \text{ - - - - } 2^n, \text{ - - - - }.$ (5)

   (c) Determine whether the series $\displaystyle\sum_{n=1}^{\infty}\left(\frac{1}{n+3} - \frac{1}{n+4}\right)$ converges or diverges ? (5)

   (d) Test the convergence of the series

   $$\sum_{n=1}^{\infty} \frac{3n^3 - 2n^2 + 4}{n^7 - n^3 + 2}$$

   using limit comparison test. (5)

3. Attempt any **two** parts :

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

   (i) loop forever

   (ii) if then else

        Also draw flow-charts for the same. (3½)

(b) Define linear and quadratic algorithms. Suppose that L is a linear algorithm that solves a problem of size 100 in 8 minutes while Q is quadratic and takes 5 minutes on same size. For a problem of size 1,000 which algorithm would you use ?
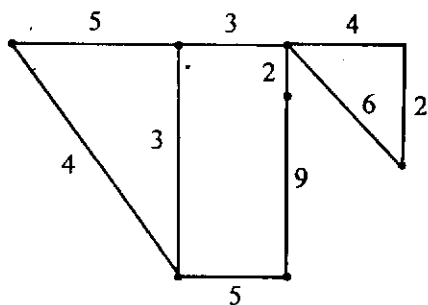
(3½)

(c) Find the greatest common divisor of the pair (34567, 891011). (3½)

4. Attempt any **two** parts :
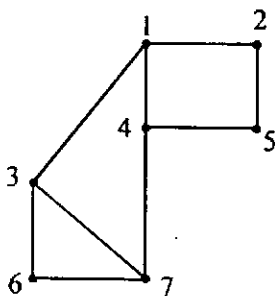
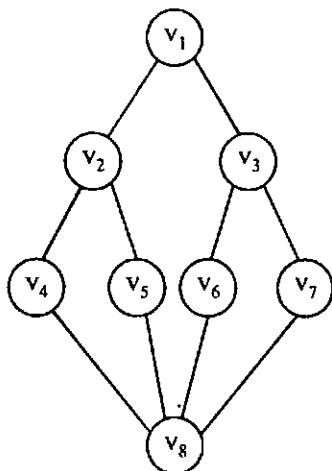(a) Find a minimum – distance spanning tree for the following graph : (4)

(b) Find depth-first-search spanning tree for the following graph : (4)

(c) Find the adjacency matrix of the following : (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 payoff matrix, the best strategies for each player and the value of the game to A. (5)

OR

Solve the following game by using the dominance property :

		Player B		
		I	II	III
Player A	I	1	7	2
	II	6	2	7
	III	6	1	6

(5)