This question paper contains 4 printed pages]

Roll No. | | | | | | | | | | |

S. No. of Question Paper : 1494

Unique Paper Code : 62355503 IC

Name of the Paper : General Mathematics-I

Name of the Course : B.A. (Prog.) Mathematics : G.E.

Semester : V

Duration : 3 Hours Maximum Marks : 75

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

Attempt *All* questions as per directed question wise.

Section I

1. Write short notes on the life and contributions of any *three* of the following mathematicians :

   (*a*) Poisson

   (*b*) Fourier

   (*c*) Euler

   (*d*) Lagrange

   (*e*) Laplace. 15

Section II

2. Attempt any *six* questions. Each question carries *five* marks :

(*a*) What do you understand by prime numbers ? Also give the definition of twin primes with examples.

(*b*) Define Goldbach conjectures and Pythagorean Triples with examples.

(*c*) Explain unit fraction and express 25/13 and 9/10 as unit fractions.

(*d*) Find the number of combinations in the word 'NUMBERS' selecting at a time :

(*i*) 2 letters

(*ii*) 6 letters.

(*e*) Explain the Fifteen Puzzle.

(*f*) Define Mersenne **Numbers and** Mersenne Primes. Give examples.

(*g*) State Prime Testing Method given by Fermat. Is the converse true. Justify your answer.

Section III

3. Do any *three* questions. Each question carries *six* marks :

(*a*) If :

$$A = \begin{pmatrix} 2 & -4 \\ 1 & 3 \end{pmatrix}, B = \begin{pmatrix} 3 & 2 \\ -1 & 5 \end{pmatrix}$$

show that :

$$(AB)^T \neq A^T B^T.$$

(*b*) Decompose the matrix :

$$\begin{pmatrix} 1 & 0 & -4 \\ 3 & 3 & -1 \\ 4 & -1 & 0 \end{pmatrix}$$

as the sum of a symmetric and a skew symmetric matrix.

(*c*) Determine whether :

$$A = \begin{pmatrix} 5 & 1 & 0 \\ 0 & -2 & -1 \\ 1 & 0 & 3 \end{pmatrix} \text{ and } B = \begin{pmatrix} 6 & 3 & 1 \\ 1 & -15 & -5 \\ -2 & -1 & 10 \end{pmatrix}.$$

Commute (i.e. AB = BA) or not.

(*d*) Find the inverse of the matrix :

$$\begin{pmatrix} 2 & -6 & 5 \\ -4 & 12 & -9 \\ 2 & -9 & 8 \end{pmatrix}.$$

4. Do any *two* questions. Each question carries *six* marks :

(*a*) If $A = \begin{pmatrix} 4 & -2 & 3 \\ -1 & 5 & 0 \\ 6 & -1 & -2 \end{pmatrix}$, find determinant of A.

(*b*) If $A = \begin{pmatrix} -1 & 4 & 1 \\ 2 & 0 & 3 \\ -1 & -1 & 2 \end{pmatrix}$, verify that $|A| = |A^T|$.

(*c*) Use Cramer's Rule to solve the following system :

$$-5x + 6y + 2z = -16$$

$$3x - 5y - 3z = 13$$

$$-3x + 3y + z = -11.$$