NP – 217

I Semester Degree Examination, February/March 2024
(NEP) (F+R)
(Open Elective)
MATHEMATICS
Business Mathematics – I

Time : 2½ Hours | Max. Marks : 60

Instruction : *Answer **all** questions.*

PART – A

Answer **any 4** questions. **(4×2=8)**

1. Define subset. Give an example.
2. Define function.
3. Find the number of 4-digit number that can be formed using the digits 1, 2, 3, 4, 5 if no digit is repeated.
4. Define Identity matrix. Give an example.
5. If $A=\begin{bmatrix}1 & 5 & 6\\ 7 & 8 & 9\\ 0 & 1 & 2\end{bmatrix}$, $B=\begin{bmatrix}4 & -2 & 3\\ 0 & 1 & 2\\ 3 & 4 & 5\end{bmatrix}$ find A + 2B.
6. If 5 : 15 : : 8 : x, find x.

PART – B

Answer **any 4** questions. **(4×5=20)**

1. If A = {1, 2, 4, 7, 9, 10}, B = {3, 7, 10} and C = {2, 4, 9}. Find the following :

   i) $A \cup B$ ii) $A \cup C$ iii) $A \cap B$

   iv) $A - C$ v) $B - A$

P.T.O.

2. In a school there are 20 teachers who teach Kannada or English. Out of these 12 teach Kannada and 4 teach both English and Kannada. How many teach English ?

3. If $A=\begin{bmatrix}2 & 5\\ 1 & 3\end{bmatrix}$, $B=\begin{bmatrix}1 & -1\\ -3 & 2\end{bmatrix}$, find AB and BA.

4. If $x\begin{bmatrix}2\\3\end{bmatrix}+y\begin{bmatrix}-1\\1\end{bmatrix}=\begin{bmatrix}10\\5\end{bmatrix}$, find the values of x and y.

5. Divide Rs. 118 among A, B, C so that A : B = 3 : 4 and B : C = 5 : 6.

6. The sum of first and third proportional is 130. The middle term is 16. Find the numbers.

PART – C

Answer **any 4** questions. **(4×8=32)**

1. a) Evaluate $\frac{2}{3}\log 8-\frac{1}{2}\log\frac{1}{4}-3\log 2$.

   b) Show that the function f : z → z defined by f(n) = 2n+1 is one-to-one.

2. a) If $x = \log_a bc$, $y = \log_b ca$ and $z = \log_c ab$, then prove that

$$\frac{1}{x+1}+\frac{1}{y+1}+\frac{1}{z+1}=1$$

   b) Prove that $\left(\frac{x^{b-c}}{x^{a-c}}\right)^{b+a}\times\left(\frac{x^{c-a}}{x^{b-a}}\right)^{c+b}\times\left(\frac{x^{a-b}}{x^{c-b}}\right)^{a+c}=1$

3. Solve the following system of equations by using matrix method.

$x + 2y + 3z = 2$

$2x + 4y + 5z = 3$

$3x + 5y + 6z = 4$

4. a) If $2A + B = \begin{bmatrix} 6 & 3 \\ 6 & -2 \end{bmatrix}$ and $3A + 2B = \begin{bmatrix} 1 & 0 \\ 0 & 5 \end{bmatrix}$, find A and B.

b) Find x if $\begin{vmatrix} x & 2 & 1 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = -12$.

5. The income of A and B are in the ratio of 5 : 3, their expenses are in the ratio of 8 : 5 and their savings are in the ratio of 2 : 1. If the total annual savings of A and B is 3600. Find their individual incomes.

6. If 12 pumps working 7 hours a day can lift 2800 tonnes of water in 20 days, in how many days can 20 pumps working 9 hours a day lift 3000 tonnes ?