MATHEMATICS , Paper – I
(English version)
Parts – A and B

Time: 21/2 hours]   [Max marks: 50

Instructions:
1. *Answer the questions under **part – A** on a separate answer book.*
2. *write the answers to the questions under **part – B** on the question paper itself and attach it to the answer book of **part – A**.*

Part – A

Time: 2 hours   **Marks: 35**

SECTION – I   5x2=10

Note:
1. *Answer **any five** questions choosing at least **two** from each group A and B.*
2. *Each question carries **two** marks.*

GROUP – A

1. Define conjunction? Draw it table motion

2. Show that A' – B' = B – A

3. If f : R – {3} → R is defined by $f(x) = \dfrac{x+3}{x-3}$ show that $f\left(\dfrac{3x+3}{x-1}\right) = x$ for $x \neq 1$

4. Define Remainder Theorem

GROUP – B

5. Maximize the point (80,40) and (0,120) for the objective function $F = \dfrac{1}{4}x + \dfrac{3}{20}y$

6. Evaluate   (a) $\displaystyle\lim_{x\to0} \dfrac{\sqrt{1+x+x^2}-1}{x}$

7. If $a = x + \sqrt{x^2+1}$ then show that $x = \dfrac{1}{2}(a - a^{-1})$

8. If 7 times the 7th term of an AP is equal to 11 times the 11th term, show that the 18th term of it is zero.

SECTION – II   4x1=4

Note:
1. *Answer **any four** questions from the following.*
2. *Each question carries **one** mark.*

9. Prove that (A')' = A

10. Define one-to function

11. Define Isoprofit line

12. Find the value of "k" so that $x^3 - 3x^2 + 4x + k$ is exactly divisible by $x - 2$

13. Solve $|2x - 3| = 7$

14. Find the values of "x" so that –2/7, x, -7/2 are three consecutive terms of a GP

<u>**SECTION – III**</u>   **4x4=16**

Note:
1. *Answer any four questions from the following, choosing at least two from each group A and B.*
2. *Each question carries four marks.*

GROUP – A

15. Prove that $A - (B \cup C) = (A - B) \cap (A - C)$

16. Let f be given $f(x) = x + 2$ and f has the domain $\{x : 2 \leq x \leq 5\}$. Find f^{-1} and its domain and range ?.

17. Let f, g, h be functions defined as $f(x) = x + 2$; $g(x) = 3x - 1$; $h(x) = 2x$. Show that ho(gof) = (hog)of

18. Using the remainder theorem find the factors of $4x^4 - 12x^3 + 7x^2 + 3x - 2$

GROUP – B

19. If $a^{x-1} = bc$; $b^{y-1} = ca$; $c^{z-1} = ab$, show that $xy + yz + zx = xyz$

20. If $y = \sqrt[3]{3} + \dfrac{1}{\sqrt[3]{3}}$, show that $3y^3 - 9y = 10$.

21. If the sum of the first "n" natural numbers is S_1 and that of squares S_2 and cubes S_3, show that
$$9S_2^2 = S_3(1 + 8S_1)$$

22. Insert 6 HMs between $\frac{2}{3}$ and $\frac{2}{31}$

<u>**SECTION – IV**</u>   **1x5=5**

Note:
1. *Answer **any one** question from following.*
2. *The question carries **five** marks.*

23. Maximize $f = 3x + y$ subject to the constraints $8x + 5y \leq 40$; $4x + 3y \geq 12$; x, y ≥ 0

24. Draw the graph of $y = x^2 + 5x + 6$