11 P

Reg. No.

First Mid-Term Test - 2019

MATHEMATICS

Time : 1.30 hrs. Max. Marks : 50

PART - A

I. Choose the correct answer **10 x 1 = 10**

1. If $A = \{ (x, y) : y = e^x, x \in R\}$ & $B = \{(x, y) : y = e^{-x}, x \in R\}$ then $n(A \cap B)$ is a) ∞ b) 0 c) 1 d) 2
2. Let A and B be subset of the universal set N. The set of natural numbers then $A' \cup [(A \cap B) \cup B']$ is a) A b) A' c) B d) N
3. If $n(A) = 2$ $n(B \cup C) = 3$ then $n[(A \times B) \cup (A \times C)$ is
   a) 2^3 b) 3^2 c) 6 d) 5
4. The number of relation on a set containing 3 elements is
   a) 9 b) 81 c) 512 d) 1024
5. The solution of $5x - 1 < 24$ and $5x + 1 > -24$ is
   a) (4, 5) b) (–5, –4) c) (–5, 5) d) (–5, 4)
6. If 3 is the logarithm of 343 then the base is
   a) 5 b) 7 c) 6 d) 9
7. The number of roots of $(x + 3)^4 + (x + 5)^4 = 16$ is
   a) 4 b) 2 c) 3 d) 0
8. The maximum value of $4\sin^2 x + 3\cos^2 x + \sin \frac{x}{2} + \cos \frac{x}{2}$ is
   a) $4 + \sqrt{2}$ b) $3 + \sqrt{2}$ c) 9 d) 9
9. $\cos i^0 + \cos 2^0 + \cos 3^0 + \ldots + \cos 179^0 =$
   a) 0 b) 1 c) –1 d) 89
10. If $f(\theta) = |\sin \theta| + |\cos \theta|$, $\theta \in R$ than $f(\theta)$ is in the interval
    a) [0, 2] b) $[1, \sqrt{2}]$ c) [1, 2] d) [0, 1]

II. Answer any five. Q.No.17 is compulsory. **5 x 2 = 20**

11. If $n(A \cap B) = 3$ and $n(A \cup B) = 10$ then find $n(P(A \Delta B))$
12. Find the domain of $\frac{1}{1 - 2\sin x}$
13. Solve $2|x + 1| - 6 \leq 7$ and graph the solution set in number line.
14. Find the values of P for which the difference between the roots of the equation $x^2 + px + 8 = 0$ is 2.
15. Find the length of an arc of a circle of radius 5cm substending a central angle measuring 15^0.
16. Find the value i) $\sin 150^0$ ii) $\cos 135^0$

17. Solve : $|2x-3| = |x-5|$

III. Answer any five. Q.No.24 is compulsory. **5 x 3 = 15**

18. $\begin{cases} -x+4 & ; \ -\infty < x \le -3 \\ x+4 & ; \ -3 < x < -2 \\ x^2 - x & ; \ -2 \le x < 1 \\ x - x^2 & ; \ 1 \le x < 7 \\ 0 & ; \ \text{otherwise} \end{cases}$ Write the values of f at –4, 1, –2, 7, 0

19. Find the range $f(x) = \dfrac{1}{1-3\cos x}$

20. Prove that $\sqrt{2}$ is an irrational number.

21. Resolve into partial fraction $\dfrac{x}{(x+3)(x-4)}$

22. Prove that $\dfrac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \dfrac{1+\sin\theta}{\cos\theta}$

23. If $\sin\theta = \dfrac{3}{5}$ and the angle is in the second quadrant then find the values of other five trignometric function.

24. Prove that : $\dfrac{75}{16} - 2\log\dfrac{5}{9} + \log\dfrac{32}{343} = \log 2$

IV. 5 Mark question. **3 x 5 = 15**

25. The formula for converting from Fahrenheit to celsius temperature is $y = \dfrac{5x}{9} - \dfrac{160}{9}$. Find the inverse of this function and determine whether the inverse is also a function. **(OR)**
If $f, g : R \to R$ are defined by $f(x) = |x| + x$ and $g(x) = |x| - x$ find gof and fog.

26. Solve $2x^2 + x - 15 \le 0$ **(OR)**
Solve $\dfrac{x+1}{x+3} < 3$

27. If $\sin\theta + \cos\theta = m$ then prove $\cos^6\theta + \sin^6\theta = \dfrac{4 - 3(m^2-1)^2}{4}$

(OR) If $A + B + C = 180^0$ then prove
$\sin^2 A + \sin^2 B - \sin^2 C = 2\sin A \sin B \sin C$