

5. Three married couples are to be seated in a row having 6 seats in a cinema hall. If spouses are to be seated next to each other, in how many ways can they be seated? Find also the number of ways of their seating if all the ladies sit together.

16. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (i) at least one boy and one girl (ii) at least 3 girls?

Or,

How many numbers greater than 1000000 can be formed by using the digits 1, 2, 0, 2, 4, 2, 4, 2, 4?

17. Find the standard deviation of first n natural numbers

18. Using properties prove that $A \cup (B - A) = A \cup B$

Or,

Using properties prove that $A - (A - B) = A \cap B$

19. Find the domain of the function $f(x) = \frac{1}{\sqrt{x-|x|}}$

20. Using PMI prove that $\frac{1}{15} + \frac{1}{5.7} + \frac{1}{7.9} + \dots + \frac{1}{(2n+1)(2n+3)} = \frac{1}{2(2n+1)} \forall n \in \mathbb{N}$

21. Draw the rough sketch of the graph of the greatest integer function. From the graph find the domain and the range of the function. (graph paper not required for the graph of the function)

22. Solve $\cot^2 x + \frac{3}{\sin x} + 3 = 0$

23. Prove that $\sin(A+B) \sin(A-B) = \sin^2 A - \sin^2 B$

Section D (6 marks each)

24. Solve for x , $\frac{|x+3|+x}{x+2} > 1$

25. Find the coefficient of a^4 in the product $(1+2a)^4(2-a)^5$ using binomial theorem.

Or,

Find the coefficient of x^5 in the product $(1+2x)^6(1-x)^7$ using binomial theorem.

26. Find the mean deviation about median for the data

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Freq.	6	8	14	16	4	2

Or,

The mean of 5 observations is 4.4 and their variance is 8.24. If three of these observations are 1, 2, 6, find the other two observations.

27. Prove that $\tan x + \tan(x+60^\circ) + \tan(120^\circ) = 3 \tan 3x$

Or,

Prove that $\cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x + \frac{2\pi}{3}\right) = \frac{3}{2}$

28. Using PMI prove that $5^n - 5$ is divisible by 4 $\forall n \in \mathbb{N}$. using this prove that $2.7^n + 3.5^n - 5$ is divisible by 24 $\forall n \in \mathbb{N}$

29. Solve the equation $x^2 - (7-l)x - (18-l) = 0$

SS-1/TE1/17
MA/041/2
3/10/17
SET-2

Max. Marks: 100

Maximum Time: 3 Hrs

Instructions:

All questions are compulsory.

- Q Nos. 1 to 4 1 marks each
Q Nos. 5 to 12 2 marks each
Q Nos. 13 to 23 4 marks each
Q Nos. 24 to 29 6 marks each

Section A (1 mark each)

1. Evaluate $\left(-2 - \frac{1}{3}i\right)^3$
2. Find the middle term in the expansion of $\left(x + \frac{1}{x}\right)^6$
3. State whether $A - (B \cup C) = (A - B) \cup C$. Justify your answer.
4. Find the value of $\cot\left(-\frac{15\pi}{3}\right)$

Section B (2 marks each)

5. Write the complex number $-1 + i$ in polar form
6. Find all pairs of consecutive odd natural numbers, both of which are larger than 10, such that their sum is less than 40.
7. From a class of 25 students, 10 are to be chosen for an excursion party. There are 3 students who decide that either all of them will join or none of them will join. In how many ways can the excursion party be chosen?
8. Using Binomial Theorem, prove that $9^{n+1} - 8n - 9$ is divisible by 64, n is a positive integer.
9. In a group of 65 people, 40 like cricket, 10 like cricket and tennis both. How many like tennis only and not cricket. How many like tennis? How does sports affect the personal behavior?
10. Let f be the subset of $Z \times Z$ defined by $f = \{(ab, a + b); a, b \in Z\}$. Is f a function?
11. Prove that $\tan 50^\circ = \tan 40^\circ + 2 \tan 10^\circ$
12. Prove that $\sin 2x + 2 \sin 4x + \sin 6x = 4 \cos^2 x \sin 4x$

Section C (4 marks each)

13. If $(x + iy)^{\frac{1}{3}} = a + ib$; $x, y, a, b \in R$ & $\frac{x}{a} - \frac{y}{b} = k(a^2 + b^2)$, find the value of k .
14. Solve the system of linear inequations $2x + 3y \leq 6$, $3x + 2y \leq 6$, $x, y \geq 0$ graphically.
Or,
Solve the system of linear inequations $2x + 3y \leq 6$, $x + 4y \leq 4$, $x, y \geq 0$ graphically.