

HIGHER SECONDARY MODEL QUESTIONS

MATHEMATICS

Class - XI | (Semester - I)

F.M. = 40

1. If sets A and B are defined as $A = \{(x, y) : y = 1/x, x \neq 0, x \in \mathbb{R}\}$ and $B = \{(x, y) : y = -x, x \in \mathbb{R}\}$ then
- (a) $A \cap B = A$ (b) $A \cap B = B$
(c) $A \cap B = \emptyset$ (d) $A \cup B = A$
2. In a class of 60 students, 25 students play cricket and 20 students play tennis and 10 students play both the games. Then the number of students who play neither is—
- (a) 0 (b) 25
(c) 35 (d) 45
3. If $R = \{(x, y) : x, y \in \mathbb{Z}, x^2 + y^2 \leq 4\}$ is a relation on $\mathbb{Z}$, then domain of R is—
- (a) $\{0, 1, 2\}$ (b) $\{0, -1, -2\}$
(c) $\{-2, -1, 0, 1, 2\}$ (d) none of these
4. If $\sin 2\alpha + \sin 2\beta = 3$ and $\cos 2\alpha + \cos 2\beta = 4$ then the value of $\tan 2(\alpha + \beta)$ is—
- (a) $25/7$ (b) $25/12$
(c) $25/13$ (d) $24/7$
5. The range of $f(x) = \frac{1}{(1 - 2 \cos x)}$ is—
- (a) $[1/3, 1]$ (b) $[-1, 1/2]$
(c) $(-\infty, -1] \cup [1/3, \infty)$ (d) $[-1/3, 1]$
6. If $2f(x) + 3f(-x) = x^2 - x + 1$ then the value of $f(2)$ is—
- (a) 3 (b) 2
(c) -2 (d) -3
7. If $\sin \alpha + \sin \beta = 2$, then the value of $\cos(\alpha + \beta)$ is—
- (a) 1 (b) -1
(c) 0 (d) none of these
8. The minimum value of $3 \cos x + 4 \sin x + 8$ is—
- (a) 5 (b) 9
(c) 7 (d) 3
9. If $\sin x + \sin y = \sqrt{3}(\cos y - \cos x)$, then $\sin 3x + \sin 3y =$
- (a) $2 \sin 3x$ (b) 0
(c) 1 (d) none of these
10. If $\tan x = \frac{a}{b}$, then $b \cos 2x + a \sin 2x$ is equal to—
- (a) a (b) b
(c) $\frac{a}{b}$ (d) $\frac{b}{a}$
11. The general value of x satisfying the equation $\sqrt{3} \sin x + \cos x = \sqrt{3}$ is given by—
- (a) $x = n\pi + (-1)^n \frac{\pi}{3}, n \in \mathbb{Z}$ (b) $x = n\pi \pm \frac{\pi}{6}, n \in \mathbb{Z}$
(c) $x = n\pi + (-1)^n \frac{\pi}{3} - \frac{\pi}{6}, n \in \mathbb{Z}$ (d) $x = n\pi \pm \frac{\pi}{3}, n \in \mathbb{Z}$

12. The amplitude of $\frac{1}{i}$ is equal to—

- (a) 0 (b) $\frac{\pi}{2}$
(c) $-\frac{\pi}{2}$ (d) π

13. Which of the following is correct for any two complex numbers Z_1 and Z_2 ?

- (a) $|z_1 + z_2| \geq |z_1| + |z_2|$ (b) $\arg(z_1 z_2) = \arg(z_1) \arg(z_2)$
(c) $|z_1 + z_2| = |z_1| + |z_2|$ (d) $|z_1 z_2| = |z_1||z_2|$

14. $\sin x + i \cos 2x$ and $\cos x - i \sin 2x$ are conjugate to each other for—

- (a) $x = n\pi$ (b) $x = (x + \frac{1}{2})\frac{\pi}{2}$
(c) $x = 0$ (d) No value of x

15. The roots of the equation $i x^2 - x + 12i = 0$ are—

- (a) $4i, -3i$ (b) $-4i, 3i$
(c) $4i, 3i$ (d) $-4i, -3i$

16. The least value of k which makes the roots of the equation $x^2 + 5x + k = 0$ imaginary is—

- (a) 4 (b) 5
(c) 6 (d) 7

17. $\frac{(x-3)}{|x-3|} \geq 0$, then

- (a) $x \in [3, \infty)$ (b) $x \in (-\infty, 3)$
(c) $x \in (3, \infty)$ (d) $x \in (-\infty, 3]$

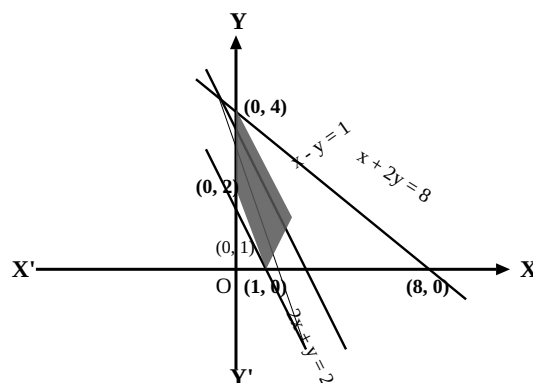
18. The solution set of the inequation $\frac{(|x| + 1)}{(|x| - 1)} < 0$ is—

- (a) $[-1, 1)$ (b) $(-1, 1)$
(c) $[-1, 1]$ (d) $(-1, 1]$

19. The number of integral solutions of $\frac{(x+2)}{(x^2+1)} > \frac{1}{2}$ are—

- (a) 3 (b) 2
(c) 4 (d) 0

20. The linear inequations, for which the shaded area in the following figure is the solution set, are



- (a) $x + 2y \geq 8, 2x + y \geq 2, x - y \leq 1, x \geq 0, y \geq 0$ (b) $x + 2y \leq 8, 2x + y \leq 2, x - y \leq 1, x \geq 0, y \geq 0$
(c) $x + 2y \leq 8, 2x + y \geq 2, x - y \leq 1, x \geq 0, y \geq 0$ (d) $x + 2y \leq 8, 2x + y \geq 2, x - y \geq 1, x \geq 0, y \geq 0$

21. If the letters of the word 'LATE' are arranged in all possible ways and these words are written out as in a dictionary, then the rank of the word 'LATE' is—

- (a) 13 (b) 12
(c) 14 (d) 15

22. $(n^2 - n)C_2 = (n^2 - 4)C_4$, then $n =$

- (a) 2 (b) 3
(c) 4 (d) none of these

23. The number of ways in which a team of 11 players can be selected from 22 players always including 2 of them and excluding 4 of them, is

- (a) ${}^{16}C_{11}$ (b) ${}^{16}C_5$
(c) ${}^{16}C_9$ (d) ${}^{20}C_9$

24. The value of $\lim_{x \rightarrow 0} \frac{|\sin x|}{x}$ is

- (a) 1 (b) -1
(c) 2 (d) does not exist

25. $\lim_{x \rightarrow 0} \frac{(e^x + e^{-x} - 2)}{x^2}$ is equal to

- (a) 0 (b) 1
(c) 2 (d) does not exist

26. $\lim_{x \rightarrow e} \frac{(\log_e x - 1)}{(x - e)} =$

- (a) e (b) 1
(c) $\frac{1}{e}$ (d) 0

27. $\lim_{x \rightarrow 0} \frac{(2x - \sin x)}{(\tan x + x)} =$

- (a) -1 (b) $-\frac{1}{2}$
(c) 1 (d) $\frac{1}{2}$

28. If $f(x) = \log_2 x^3$ then $f'(x) =$

- (a) $\frac{3}{2}$ (b) 1
(c) 0 (d) $\frac{1}{x}$

29. If $f(1) = 1$, $f'(1) = 2$, then the value of $\lim_{x \rightarrow 1} \frac{(\sqrt{f(x)} - 1)}{(\sqrt{x} - 1)}$ is

- (a) 1 (b) 0
(c) -1 (d) 2

30. If $f(x) = mx + c$ and $f(0) = f'(0) = 1$, then $f'(2) =$

- (a) 2 (b) 3
(c) 1 (d) 0

31. If $y = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \infty$, then $\frac{dy}{dx} =$

- (a) $y + 1$ (b) $y - 1$
(c) y^2 (d) y

32. Each side of an equilateral triangle is increasing at the rate of 8 cm/hr. The rate of increase of its area when side is 2 cm, is

- (a) $8\sqrt{3} \text{ cm}^2 / \text{hr}$ (b) $4\sqrt{3} \text{ cm}^2 / \text{hr}$
(c) $16\sqrt{3} \text{ cm}^2 / \text{hr}$ (d) none of these

33. The slope of the curve $2y^2 = ax^2 + b$ at $(1, -1)$ is -1 . The values of a, b are—

- (a) $a = 2, b = 1$ (b) $a = 2, b = 0$
(c) $a = 0, b = 2$ (d) $a = 1, b = 1$

34. **Assertion (A):** If $A = \{1, 2, 3\}$, $B = \{2, 4\}$, then the number of relations from A to B is equal to 64.

Reason (R): The total number of relations from set A to set B is equal to $2^{n(A) \cdot n(B)}$.

- (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false. (d) A is false but R is true.

35. **Assertion (A):** If $f(\theta) = (\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2$, then the minimum value of $f(\theta)$ is 9.

Reason (R): The minimum value of $\sin \theta$ is 1.

- (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false. (d) A is false but R is true.

36. Compare column I with column II and choose the correct answer.

Column I	Column II
i) $\arg(z_1 z_2)$	m) $\pi/2$
ii) $\arg(z_1^{1/2} z_2)$	n) $\arg(z_1) + \arg(z_2) + 2k\pi$, where $k = 0, -1, 1$
iii) $\arg(z) + \arg(z)$, where z is not purely real	o) $\arg(z_1) - \arg(z_2) + 2k\pi$, where $k = 0, -1, 1$
iv) $\arg(i)$	p) 0

- (a) (i) - (o), (ii) - (n), (iii) - (p), (iv) - (m) (b) (i) - (n), (ii) - (m), (iii) - (o), (iv) - (p)
(c) (i) - (n), (ii) - (o), (iii) - (m), (iv) - (p) (d) (i) - (n), (ii) - (o), (iii) - (p), (iv) - (m)

Read the following passage carefully and answer the questions (37) and (38).

To check the understanding of sets, a Mathematics teacher writes two sets A and B having finite number of elements. The sum of cardinal numbers of two finite sets A and B is 9. The ratio of cardinal number of the power set of A is to cardinal number of the power set of B is 8:1.

37. The cardinal number of set A is

- (a) 3 (b) 6
(c) 2 (d) 9

38. The maximum value of $n(A \cup B)$ is

- (a) 3 (b) 6
(c) 9 (d) 12

Read the following text carefully and answer the questions (39) and (40):

The purpose of the student council is to give students an opportunity to develop leadership by organising and carrying and school activities and service projects. Create an environment where every student can voice out their concern or need. Raju, Ravi, Masud, Snigdha, Payel, Rinku and Rahim are members of student's council. There is a photo session in a school these 7 students are to be seated in a row.

39. The total number of arrangements so that Raju and Ravi are at extreme positions are

- (a) 120 (b) 60
(c) 480 (d) 240

40. The number of arrangements so that Masud is sitting in the middle are

- (a) 240 (b) 1440
(c) 720 (d) 360

ANSWERS

Sub : Mathematics | Class - XI | Semester - I

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|------|---|------|---|------|---|------|---|
| (1) | c | (11) | d | (21) | c | (31) | d |
| (2) | b | (12) | c | (22) | b | (32) | a |
| (3) | c | (13) | d | (23) | c | (33) | b |
| (4) | d | (14) | d | (24) | d | (34) | a |
| (5) | c | (15) | b | (25) | b | (35) | a |
| (6) | a | (16) | d | (26) | c | (36) | d |
| (7) | b | (17) | c | (27) | d | (37) | b |
| (8) | d | (18) | b | (28) | c | (38) | c |
| (9) | b | (19) | a | (29) | d | (39) | d |
| (10) | b | (20) | c | (30) | c | (40) | c |