EXAMINATION PAPER, 2020

Jharkhand Academic Council, Ranchi

MATHEMATICS

Class XI

[*Full Marks* : 40

: 1 Hour]

General Instructions :

1. Write your Name, Roll Code, Roll No., Registration No., Faculty and Paper on the OMR Answer Sheet in the provided. Put your Full Signature on the OMR Answer Sheet in the space provided.
2. There are 40 Multiple Choice Questions in all.
3. All questions are compulsory. Each question carries 1 mark.
4. Four options are given for each question numbered 1 to 4. Choose the correct option and indicate it by blackening the appropriate circle [●] in the OMR Answer Sheet given separately. Use only Blue/Black Ball-Point Pen. **The use of Pencil is not allowed.**
5. Before leaving the examination hall hand over the OMR Answer Sheet to the invigilator. You are allowed to take the question paper with you.

1. Write the Roster form of the set :
If A = {x : x is letters of the word BETTER}
(a) A = {B, E, T, R} (b) A = {B, E, T, T, E R} (c) A = {B, E, T, E, R} (d) A = {B, T, R}

2. If A = {0, 1, 2, 3, 4} and B = {1, 2, 3} then A – B will be :
(a) {0, 1, 2} (b) {1, 2, 3} (c) both (a) and (b) (d) none of these

3. If X and Y are two sets such that X has 21 elements, Y has 32 elements and 11 elements are common to X and Y then $n(X \cup Y) = ?$
(a) 64 (b) 53 (c) 42 (d) none of these

4. If A and B are two sets such that $A \cap B = A$ then $A \cup B = ?$
(a) ϕ (b) A (c) B (d) none of these

5. If A = {1, 2}, B = {3, 4} and C = {2, 4} then the number of elements in A × (B × C) will be :
(a) 6 (b) 8 (c) 16 (d) none of these

6. If $f(x) = x^2 - 4x + 1, x \in R$, then the value of $f\left(\frac{1}{2}\right)$ will be :
(a) $-\frac{3}{4}$ (b) $\frac{4}{3}$ (c) 2 (d) $\frac{1}{2}$

7. If $(x + y, x - y) = (3, 5)$ then x and y will be :
(a) $x = 3, y = 1$ (b) $x = 1, y = 3$ (c) $x = 4, y = -1$ (d) $x = 5, y = 2$

8. If A and B be two sets such that A × B = (3, 2), (3, 4), (5, 2), (5, 4), then the element of A will be :
(a) A = {3, 4} (b) A = {3, 5} (c) A = {4, 3} (d) A = {1, 3}

9. If the angles of a triangle are in ratio 3 : 4 : 5, the smallest angle in degree will be :
(a) 45° (b) 75° (c) 60° (d) 90°

10. If $\tan\theta = \frac{3}{4}$ and θ is in third quadrant, then the value of $\sin\theta - \cos\theta$ will be :
(a) $\frac{1}{5}$ (b) $\frac{4}{5}$ (c) $\frac{3}{5}$ (d) none of these

11. The value of $\cos^2 A + \cos^2\left(A + \frac{2p}{3}\right) + \cos^2\left(A - \frac{2p}{3}\right)$ will be :
(a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) none of these

12. The value of $\frac{\sin A + \sin 3A}{\cos 3A + \cos A}$ will be :

(a) cot 2A (b) tan 2A (c) tan A (d) cot 3A

13. If $6x = 90°$, then $\frac{\tan 3x - \tan 2x - \tan x}{\tan 3x . \tan 2x . \tan x} = ?$

(a) 0 (b) 2 (c) – 1 (d) none of these

14. The conjugate of the complex number $x = a + ib$ will be :

(a) $a - ib$ (b) $-a + ib$ (c) $-a - ib$ (d) $a + ib$

15. The modulus of the complex number $z = \frac{1 - 1\sqrt{3}}{2 - 2i}$ will be :

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2\sqrt{2}}$ (c) $\frac{1}{\sqrt{3}}$ (d) none of these

16. All the roots of the equation $x^2 + 1 = 0$ will be :

(a) $2i, -2i$ (b) $3i, -3i$ (c) $i, -i$ (d) $1 + i, 1 - i$

17. If ${}^nP_6 = 20 \times {}^nP_3$, the value of n will be :

(a) 6 (b) 8 (c) 15 (d) 10

18. If ${}^{16}C_r = {}^{15}C_{r+2}$ then the value of r will be :

(a) 2 (b) 3 (c) 7 (d) 8

19. The number of terms in the expansion of $(x^2 - 2 + \frac{1}{x^2})^{20}$ is :

(a) 41 (b) 40 (c) 35 (d) 100

20. In the expansion $(x^3 - \frac{1}{x^2})^{15}$, the constant term is :

(a) ${}^{15}C_6$ (b) 0 (c) $-{}^{15}C_4$ (d) none of these

21. The 5th term in the expansion of $(x^2 + 2y)^5$ will be :

(a) $10\,x^8y$ (b) $32x^3y^5$ (c) $30x^2y^2$ (d) none of these

22. Which term of the sequence
5, 7, 9, 11 .....is 27 ?

(a) 13th (b) 12th (c) 11th (d) 10th

23. If 5th term of an A. P. is 11 and the 9th term is 7, then the 16th term will be :

(a) 11 (b) 7 (c) 16 (d) 0

24. If a, $a + 1$, $a + 3$ are in G. P. then a will be :

(a) 1 (b) 2 (c) 3 (d) 4

25. Which term of the series $\frac{1}{27} + \frac{1}{9} + \frac{1}{3}$ ..... is 243 ?

(a) 6th (b) 7th (c) 9th (d) 8th

26. If $1 + 2 + 2^2 + 2^3 + ... + 2^{n-1} = 255$, then the value of n will be :

(a) 6 (b) 7 (c) 8 (d) 5

27. Find the equation of the straight line which passes through the point (2, 3) and cut off equal intercept on the axes.

(a) $x + y = 4$ (b) $x + y = 5$ (c) $x + y = 6$ (d) $2x + 3y = 9$

28. The centre of the circle $3x^2 + 3y^2 - 12x - 15y + 6 = 0$, will be :

(a) (2, 5) (b) $(-2, \frac{5}{2})$ (c) $(2, \frac{5}{2})$ (d) (1, 3)

29. The length of the latus rectum of the parabola $x^2 = -16y$ will be :

(a) – 16 (b) 16 (c) 12 (d) 4

The co-ordinates of the foci of the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$ will be :

(a) $(\pm 6, 0)$ (b) $(\pm 4, 0)$ (c) $(\pm \sqrt{20}, 0)$ (d) $(\pm 1, 0)$

The eccentricity (e) of the hyperbola $4x^2 - 9y^2 = 36$ will be :

(a) $e = \frac{\sqrt{13}}{3}$ (b) $e = 3$ (c) $e = \sqrt{13}$ (d) $e = 2$

The distance of the point $(1, -3, 4)$ from x-axis is :

(a) 5 (b) -5 (c) 1 (d) $\sqrt{26}$

$\lim_{x \to 2} \frac{3x^2 - x - 10}{x^2 - 4} =$

(a) 0 (b) $\frac{1}{4}$ (c) $\frac{11}{4}$ (d) none of these

$\lim_{x \to 0} \frac{\sin 4x}{\tan 2x} =$

(a) 2 (b) 4 (c) $\frac{1}{2}$ (d) 14

If $y = ax^2 + bx + c$, then $\frac{dy}{dx}$ will be :

(a) $2ax + c$ (b) $b + c$ (c) $2ax + b$ (d) $2a + b$

The derivative of the function $x \sin x$ *w.r.t.* to x will be :

(a) $\sin x + x \cos x$ (b) $\sin x - x \cos x$ (c) $\sin x + \cos x$ (d) $\sin x$

If the mean of 6, 8, 5, 7, x and 4 is 7, then the value of x will be :

(a) 6 (b) 5 (c) 12 (d) 8

If 2/11 is the probability of an event A, what is the probability of the event "not A" ?

(a) $\frac{11}{2}$ (b) $\frac{7}{11}$ (c) $\frac{9}{11}$ (d) $\frac{1}{11}$

The probability of the occurence of number 5 on the face in throwing a dice is :

(a) $\frac{2}{5}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{6}$

If $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$ then $P(A \cup B)$ will be :

(a) $\frac{11}{24}$ (b) $\frac{1}{8}$ (c) $\frac{1}{3}$ (d) $\frac{13}{24}$