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Space for rough work

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CANDIDATE ANSWER BOOKLET JEE

CANDIDATE DETAILS

NAME OF STUDENT

DATE OF EXAMINATION / /

CLASS

BOARD

TIME DURATION : To :

Read The Instructions Carefully

- Please read these instructions carefully. A candidate who breaches any of the Examination Regulations will be liable to disciplinary action
- Examinations will be conducted during the allocated times shown in the examination timetable.
- Do NOT turn over the question paper until instructed at the time of commencement of the examination.
- Any unauthorised materials or devices found in your possession after the start of the examination will be confiscated, and you will be liable to disciplinary action.
- Handphones brought into the examination hall must be switched off at ALL times. If your handphone is found to be switched on in the examination hall, the handphone will be confiscated and retained for investigation of possible violation of regulations.
- Please check that you have the correct question paper and read the instructions printed on your examination question paper carefully.
- You are not allowed to communicate by word of mouth or otherwise with other candidates (this includes the time when answer scripts are being collected).
- Please raise your hand if you wish to communicate with an invigilator.
- Unless granted permission by an invigilator, you are not allowed to leave your seat.
- Once you have entered the examination hall, you will not be allowed to leave the hall until one hour after the examination has commenced.

Question Paper Format

- Each question carries 4 marks.
- For correct answer, +4 marks. For wrong answer, -1 marks. For no attempt, 0 marks.
- All questions are compulsory.
- The question paper contains 25 objective type questions.
- Total time duration of the examination is 60 minutes.

Score Card

+4

0

-1

Total Score

Pass Score

Result

Pass/Fail

36. Let $f(x)$ be differentiable for all x. If $f(1)=-2$ and $f'(x)\geq 2$ *for* $x\in(1,6)$ then

(A) $f(6)=5$ (B) $f(6)<5$ (C) $f(6)<8$ (D) $f(6)>8$

37. In a ΔABC, $A=\frac{2\pi}{3}$, $b-c=3\sqrt{3}$ cm and ar (ΔABC) $=\frac{9\sqrt{3}}{2}$ cm². Then a is

(A) $6\sqrt{3}$ cm (B) 9 cm (C) 18 cm (D) none of these

38. A spherical iron ball 10 cm in radius is coated with a layer of ice of uniform thickness that melts at a rate of 50 cm³/min. When the thickness of ice is 15 cm, then the rate at which the thickness of ice decreases, is

(A) $\frac{5}{6\pi}$ cm/min (B) $\frac{1}{54\pi}$ cm/min (C) $\frac{1}{18\pi}$ cm/min (D) $\frac{1}{36\pi}$ cm/min

39. Area of the greatest rectangle that can be inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

(A) 2ab (B) ab (C) $\sqrt{ab}$ (D) $\frac{a}{b}$

40. A spherical balloon is filled with 4500 π cubic meters of helium gas. If a leak in the balloon causes the gas to escape at the rate of 75 π cubic meters per minute, then the rate (in metres per minute) at which the radius of the balloon decreases 49 minutes after the leakage began is

(A) 2/9 (B) 9/2 (C) 9/7 (D) 7/9

INTEGER TYPE QUESTIONS:

1. The sides of a triangle are consecutive integers n, $n+1$ and $n+2$ and the largest angle is twice the smallest angle. Find n.

Answer: ☐

2. Find the area of the largest rectangle with lower base on the x-axis & upper vertices on the curve $y = 12 - x^2$.

Answer: ☐

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1. If the function $f(x)=2x^3-9ax^2+12a^2x+1$, where $a>0$, attains its maximum and minimum at p and q respectively such that $p^2 = q$, then 'a' equals

(A) 3 (B) 1 (C) 2 (D) 1/2

2. If $A=\begin{bmatrix}\alpha & 2\\ 2 & \alpha\end{bmatrix}$ and $|A^3|=125$, then $\alpha=$

(A) ± 3 (B) ± 2 (C) ± 5 (D) 0

3. The function $f(x)=\cot^{-1}x+x$ increases in the interval

(A) $(1,\infty)$ (B) $(-1,\infty)$ (C) $(-\infty,\infty)$ (D) $(0,\infty)$

4. The line which is parallel to x-axis and crosses the curve $y=\sqrt{x}$ at an angle of $\frac{\pi}{4}$ is

(A) y = – 1/2 (B) x = 1/2 (C) y = 1/4 (D) y = 1/2

5. Let $f(x)=\begin{cases} x & x<1 \\ 2-x & 1\leq x\leq 2 \\ -2+3x-x^2 & x>2 \end{cases}$ then $f(x)$ is

(A) differentiable at x = 1 (B) differentiable at x = 2

(C) differentiable at x = 1 and x = 2 (D) not differentiable at x = 0

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6. A particle is moving along a line such that $s = 3t^3 - 8t + 1$. Find the time 't' when the distance 'S' travelled by the particle increases.

(A) $t > \frac{2\sqrt{2}}{3}$ (B) $t < \frac{2\sqrt{2}}{3}$ (C) $t < \frac{-2\sqrt{3}}{\sqrt{2}}$ (D) $t = 0$

7. If curve $y = 1 - ax^2$ and $y = x^2$ intersect orthogonally then the value of a is

(A) 1/2 (B) 1/3 (C) 2 (D) 3

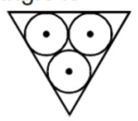
8. If $2a + 3b + 6c = 0$, then at least one root of the equation $ax^2 + bx + c = 0$ lies in the interval

(A) (0, 1) (B) (1, 3) (C) (2, 3) (D) (1, 3)

9. A particle moves along a line is given by $S = \frac{t^3}{3} - 3t^2 + 8t$ then the distance travelled by the particle before it first comes to rest is

(A) $\frac{40}{3}$ *unit* (B) $\frac{20}{3}$ *unit* (C) $\frac{3}{20}$ *unit* (D) $\frac{8}{3}$ *unit*

10. In an equilateral triangle, 3 coincs of radii 1 unit each are kept so that they touche each other and also the sides of the triangle. Area of the triangle is



(A) $4 + 2\sqrt{3}$ (B) $6 + 4\sqrt{3}$ (C) $12 + \frac{7\sqrt{3}}{4}$ (D) $3 + \frac{7\sqrt{3}}{4}$

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31. If the function $f(x) = \frac{a}{x} + x^2$, has maximum at $x = -3$, then the value of 'a' is

(A) 54 (B) -54 (C) 10 (D) -10

32. The approximate value of $\sqrt{1.02}$ is

(A) 1.01 (B) 1.001 (C) 1.0001 (D) 1.1001

33. If the curves $ay + x^2 = 7$ and $x^3 = y$ cut orthogonally at (1, 1) then a =

(A) 1 (B) -6 (C) 6 (D) 1/6

34. The least value of k for which the function $f(x) = x^2 + kx + 1$ is a increasing function in the interval $1 \le x \le 2$

(A) -1 (B) -2 (C) 1 (D) 3

35. The points on the curve $y = x^2 + \sqrt{1 - x^2}$ at which the tangent is perpendicular to x-axis are

(A) (1, 1) only (B) $(\pm 1, 1)$ (C) $(1, \pm 1)$ (D) $(-1, 1)$ only

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26. The interval in which $f(x)=x^3-3x^2-9x+20$ is strictly decreasing

(A) $(-1,3)$ (B) $(3,\infty)$ (C) $(-\infty,-1)$ (D) $(5,9)$

27. The global maximum and global minimum of $f(x)=2x^3-9x^2+12x+6$ in [0, 2]

(A) $(11,6)$ (B) $(6,11)$ (C) $(-6,11)$ (D) $(-11,6)$

28. The approximate value of $\sqrt[5]{33}$ is

(A) 2.0125 (B) 2.1 (C) 2.01 (D) 3.258

29. The slope of the normal to the curve given by $x=a(\theta-\sin\theta), y=a(1-\cos\theta)$ *at* $\theta=\frac{\pi}{2}$

(A) $\frac{-1}{2}$ (B) $\frac{1}{2}$ (C) -1 (D) 2

30. The angle between the curves $y=x^3$ and $y=e^{3(x-1)}$ at (1, 1) is

(A) 0 (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

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11. If the angles of a triangle are in the ratio 4 : 1 : 1, then the ratio of the longest side to the perimeter is

(A) $\sqrt{3}:(2+\sqrt{3})$ (B) 1 : 6 (C) 1 : 2 + $\sqrt{3}$ (D) 2 : 3

12. Let $\Delta=\begin{vmatrix}1 & \sin\theta & 1\\ -\sin\theta & 1 & \sin\theta\\ -1 & -\sin\theta & 1\end{vmatrix}, 0\le\theta\le 2\pi$. The

(A) $\Delta=0$ (B) $\Delta\in(2,\infty)$ (C) $\Delta\in(2,4)$ (D) $\Delta\in[2,4]$

13. $A=\begin{vmatrix}1 & 1 & 1\\ a^2 & b^2 & c^2\\ a^3 & b^3 & c^3\end{vmatrix}$, then find A

(A) $(a-b)(b-c)(c-a)$ (B) $(a-b)(b-c)(c-a)(abc)$

(C) $(a+b)(b+c)(c+a)$ (D) None of these

14. The sides of a triangle are in the ratio 1 : $\sqrt{3}$: 2, then the angle of the triangle are in the ratio

(A) 1 : 3 : 5 (B) 2 : 3 : 4 (C) 3 : 2 : 1 (D) 1 : 2 : 3

15. A point on the parabola $y^2=18x$ at which the ordinate increases at twice the rate of the abscissa, is

(A) (2, 4) (B) (2, -4) (C) $\left(-\frac{9}{8},\frac{9}{2}\right)$ (D) $\left(\frac{9}{8},\frac{9}{2}\right)$

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16. Angle between the tangents to the curve $y = x^2 - 5x + 6$ at the points (2, 0) and (3, 0) is

(A) $\pi/2$ (B) $\pi/6$ (C) $\pi/4$ (D) $\pi/3$

17. The function $f(x) = \frac{x}{2} + \frac{2}{x}$ has a local minimum at

(A) $x = -2$ (B) $x = 0$ (C) $x = 1$ (D) $x = 2$

18. $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & -2 & 4 \end{bmatrix}, I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and $A^{-1} = \left[\frac{1}{6}(A^2 + cA + dI)\right]$, then the value of c and d are

(A) –6, –11 (B) 6, 11 (C) –6, 11 (D) 6, – 11

19. $\begin{vmatrix} 0 & a-b & a-c \\ b-a & 0 & b-c \\ c-a & c-b & 0 \end{vmatrix} =$

(A) *abc* (B) $a+b+c$ (C) 0 (D) $a^2b^2c^2$

20. If $\Delta = \begin{vmatrix} 1+y & 1-y & 1-y \\ 1-y & 1+y & 1-y \\ 1-y & 1-y & 1+y \end{vmatrix} = 0$, then value of y are

(A) 0, 3 (B) 2, –1 (C) –1, 3 (D) 0, 2

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21. Find Value of 'c' by using Rolle's theorem for $f(x) = \log(x^2 + 2) - \log 3$ on $[-1, 1]$

(A) 0 (B) 1 (C) -1 (C) does not exists

22. In a triangle ABC, B = 60° and C = 45°. Let D divides BC internally in the ratio 1 : 3, then, $\frac{\sin\angle BAD}{\sin\angle CAD} =$

(A) $\sqrt{\frac{2}{3}}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{1}{\sqrt{6}}$ (D) $\frac{1}{3}$

23. The equation of the tangent to the curve $y = x + \frac{4}{x^2}$, that is parallel to the x-axis is

(A) $y = 1$ (B) $y = 2$ (C) $y = 3$ (D) $y = 0$

24. The function $f(x) = \tan^{-1}(\sin x + \cos x)$ is an increasing function in

(A) $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$ (B) $\left(\frac{-\pi}{2}, \frac{\pi}{4}\right)$ (C) $\left(0, \frac{\pi}{2}\right)$ (D) $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

25. The normal to the curve $x^2 + 2xy - 3y^2 = 0$ at $(1,1)$

(A) does not meet the curve again

(B) meet the curve again in second quadrant

(C) meet the curve again in the third quadrant

(D) meet the curve again in forth quadrant

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