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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

TOPIC: Linear Differential Equations

1. The differential equation representing the family of curves, $y^2 = 2c\left(x + \sqrt{c}\right)$, where c is a positive parameter, is of :
(A) order 1 (B) order 2 (C) degree 3 (D) degree 4

2. A soluton of the differential equation, $\left(\frac{dy}{dx}\right)^2 - x\frac{dy}{dx} + y = 0$ is :
(A) $y = 2$ (B) $y = 2x$ (C) $y = 2x - 4$ (D) $y = 2x^2 - 4$

3. If $\frac{dy}{dx} = 1 + x + y + xy$ and $y(-1) = 0$, then function y is
(A) $e^{(1-x)^2/2}$ (B) $e^{(1+x)^2/2} - 1$ (C) $\log_e(1 + x) - 1$ (D) $1 + x$

4. A tangent drawn to the curve, $y = f(x)$ at P(x, y) cuts the x-axis at A and B respectively such that BP : AP = 3 : 1, given that $f(1) = 1$, then
(A) equation of the curve is $x\frac{dy}{dx} - 3y = 0$ (B) equation of curve is $x\frac{dy}{dx} + 3y = 0$
(C) curve passes through (2, 1/8) (C) normal at (1, 1) is $x + 3y = 4$

5. The differential equation for all the straight lines which are at a unit distance from the origin is
(A) $\left(y - x\frac{dy}{dx}\right)^2 = 1 - \left(\frac{dy}{dx}\right)^2$ (B) $\left(y + x\frac{dy}{dx}\right)^2 = 1 + \left(\frac{dy}{dx}\right)^2$
(C) $\left(y - x\frac{dy}{dx}\right)^2 = 1 + \left(\frac{dy}{dx}\right)^2$ (D) $\left(y + x\frac{dy}{dx}\right)^2 = 1 - \left(\frac{dy}{dx}\right)^2$

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TOPIC: Miscelleneous

26. Given an isosceles triangle, whose one angle is 120° and radius of its incircle is $\sqrt{3}$. Then the area of triangle in sq. units is
(A) $7 + 12\sqrt{3}$ (B) $12 - 7\sqrt{3}$ (C) $12 + 7\sqrt{3}$ (D) 4π

27. If $\int_0^{t^2} x f(x)\,dx = \frac{2}{5}t^5$, $t > 0$, then $f\left(\frac{4}{25}\right) =$
(A) $\frac{2}{5}$ (B) $\frac{5}{2}$ (C) $-\frac{2}{5}$ (D) 1

28. $\int_{-2}^{0}\left(x^3 + 3x^2 + 3x + 3 + (x+1)\cos(x+1)\right)dx$ is equal to
(A) – 4 (B) 0 (C) 4 (D) 6

29. 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) $\Delta \in [2, 4]$

30. 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. The area bounded by the x-axis and the curve $y = 4x - x^2 - 3$ is

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{4}{3}$ (D) $\frac{8}{3}$

22. The area of the region for which $0 < y < 3 - 2x - x^2$ and $x > 0$ is

(A) $\int_1^3 (3 - 2x - x^2)\,dx$ (B) $\int_0^3 (3 - 2x - x^2)\,dx$ (C) $\int_0^1 (3 - 2x - x^2)\,dx$ (D) $\int_{-1}^3 (3 - 2x - x^2)\,dx$

23. The area bounded by the curve $y = \sin ax$ with x-axis in one arc of the curve is

(A) $\frac{4}{a}$ (B) $\frac{2}{a}$ (C) $\frac{1}{a}$ (D) 2a

24. The area contained between the curve $xy = a^2$, the vertical line $x = a$, $x = 4a$ $(a > 0)$ and x-axis is

(A) $a^2 \log 2$ (B) $2a^2 \log 2$ (C) $a \log 2$ (D) $2a \log 2$

25. The area of the region enclosed between the curves $7x^2 + 9y + 9 = 0$ and $5x^2 + 9y + 27 = 0$ is:

(A) 2 (B) 4 (C) 8 (D) 16

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6. If integrating factor of $x(1 - x^2)\,dy + (2x^2 y - y - ax^3)\,dx = 0$ is $e^{\int p\,.dx}$, then P is equal to

(A) $\frac{2x^2 - ax^3}{x(1 - x^2)}$ (B) $(2x^2 - 1)$ (C) $\frac{2x^2 - 1}{ax^3}$ (D) $\frac{(2x^2 - 1)}{x(1 - x^2)}$

7. The differential equation of all 'Simple Harmonic Motions' of given period $\frac{2\pi}{n}$ is

(A) $\frac{d^2x}{dt^2} + nx = 0$ (B) $\frac{d^2x}{dt^2} + n^2 x = 0$ (C) $\frac{d^2x}{dt^2} - n^2 x = 0$ (D) $\frac{d^2x}{dt^2} + \frac{1}{n^2}x = 0$.

8. If p and q are order and degree of differential equation $y\frac{dy}{dx} + x^3\left(\frac{d^2y}{dx^2}\right) + xy = \cos x$, then

(A) p < q (B) p = q (C) p > q (D) none of these

9. Integral curve satisfying $y' = \frac{x^2 + y^2}{x^2 - y^2}$, $y(1) = 2$, has the slope at the point (1, 2) of the curve, equal to

(A) $-\frac{5}{3}$ (B) -1 (C) 1 (D) $\frac{5}{3}$

10. The differential equation obtained on eliminating A and B from $= y = A\cos(\omega t) + B\sin(\omega t)$ is

(A) $y'' + y' = 0$ (B) $y'' - \omega^2 y = 0$ (C) $y'' = -\omega^2 y$ (D) $y'' + y = 0$

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TOPIC: VECTOR ALGEBRA

11. The position vectors of three points A, B, C are $\hat{i} + 2\hat{j} + 3\hat{k}$, $2\hat{i} + 3\hat{j} + \hat{k}$ & $3\hat{i} + \hat{j} + 2\hat{k}$. A unit vector perpendicular to the plane of the triangle ABC is:

(A) $\left(-\frac{1}{\sqrt{3}}\right)(\hat{i}+\hat{j}+\hat{k})$ (B) $\left(\frac{1}{\sqrt{3}}\right)(\hat{i}-\hat{j}+\hat{k})$ (C) $\left(\frac{1}{\sqrt{3}}\right)(\hat{i}+\hat{j}-\hat{k})$ (D) none

12. The lengths of the diagonals of a parallelogram constructed on the vectors $\vec{p} = 2\vec{a} + \vec{b}$ & $\vec{q} = \vec{a} - 2\vec{b}$, where $\vec{a}$ & $\vec{b}$ are unit vectors forming an angle of 60º are:

(A) 3 & 4 (B) $\sqrt{7}$ & $\sqrt{13}$ (C) $\sqrt{5}$ & $\sqrt{11}$ (D) none

13. Vectors $\vec{a}$ & $\vec{b}$ make an angle $\theta = \frac{2\pi}{3}$. If $|\vec{a}| = 1, |\vec{b}| = 2$ then $\left\{(\vec{a} + 3\vec{b}) \times (3\vec{a} - \vec{b})\right\}^2 =$

(A) 225 (B) 250 (C) 275 (D) 300

14. Vectors $\vec{a}$ & $\vec{b}$ make an angle $\theta = \frac{2\pi}{3}$. If $|\vec{a}| = 1, |\vec{b}| = 2$ then $\left\{(\vec{a} + 3\vec{b}) \times (3\vec{a} - \vec{b})\right\}^2 =$

(A) 225 (B) 250 (C) 275 (D) 300

15. If $\vec{r} \times \vec{b} = \vec{c} \times \vec{b}$ & $\vec{r} \cdot \vec{a} = 0$ where $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}$, $\vec{b} = 3\hat{i} - \hat{j} + \hat{k}$ & $\vec{c} = \hat{i} + \hat{j} + 3\hat{k}$, then $\vec{r}$ is equal to:

(A) $2(\hat{i}-\hat{j}+\hat{k})$ (B) $2(\hat{i}+\hat{j}-\hat{k})$ (C) $2(-\hat{i}+\hat{j}+\hat{k})$ (D) $2(\hat{i}+\hat{j}+\hat{k})$

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TOPIC: AREA UNDER CURVES

16. The triangle formed by the tangent to the curve $f(x) = x^2 + bx - b$ at the point (1, 1) and the coordinate axes, lies in the first quadrant. If its area is 2, then the value of b is

(A) – 1 (B) 3 (C) – 3 (D) 1

17. The areas of the figure into which curve $y^2 = 6x$ divides the circle $x^2 + y^2 = 16$ are in the ratio

(A) $\frac{2}{3}$ (B) $\frac{4\pi - \sqrt{3}}{8\pi + \sqrt{3}}$ (C) $\frac{4\pi + \sqrt{3}}{8\pi - \sqrt{3}}$ (D) none of these

18. The area bounded by $x^2 + y^2 - 2x = 0$ & $y = \sin\frac{\pi x}{2}$ in the upper half of the circle is:

(A) $\frac{\pi}{2} - \frac{4}{\pi}$ (B) $\frac{\pi}{4} - \frac{2}{\pi}$ (C) $\pi - \frac{8}{\pi}$ (D) none

19. The area bounded by the curve $x^2 = 4y$, x-axis and the line x = 2 is

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

20. The area bounded by $y = x^2$, $y = [x + 1]$, $x \le 1$ and the y-axis is

(A) 1/3 (B) 2/3 (C) 1 (D) 7/3

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