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

CHAPTER: MATRICES AND DETERMINANTS

1. If the system of equations x + 2y + 3z = 4, x + py + 2z = 3, x + 4y + μz = 3 has an infinite number of solutions, then:
(A) p = 2, μ = 3 (B) p = 2, μ = 4 (C) 3 p = 2 μ (D) none of these

2. If a, b, c are complex number and z = $\begin{vmatrix} 0 & -b & -c \\ \bar{b} & 0 & -a \\ \bar{c} & \bar{a} & 0 \end{vmatrix}$ is
(A) purely real (B) purely imaginary (C) 0 (D) none of these

3. Let f (θ) = $\begin{vmatrix} \cos^2\theta & \cos\theta\sin\theta & -\sin\theta \\ \cos\theta\sin\theta & \sin^2\theta & \cos\theta \\ \sin\theta & -\cos\theta & 0 \end{vmatrix}$ then f$\left(\frac{\pi}{6}\right)$ =
(A) 0 (B) 1 (C) 2 (D) none

4. If the matrix $\begin{bmatrix} 0 & 2\beta & \gamma \\ \alpha & \beta & -\gamma \\ \alpha & -\beta & \gamma \end{bmatrix}$ is orthogonal, then
(A) $\alpha = \pm\frac{1}{\sqrt{2}}$ (B) $\beta = \pm\frac{1}{\sqrt{6}}$ (C) $\gamma = \pm\frac{1}{\sqrt{3}}$ (D) all of these

5. If A = dig (2, –1, 3), B = dig (–1, 3, 2), then A^2B =
(A) dig (5, 4, 11) (B) dig (–4, 3, 18) (C) dig (3, 1, 8) (D) B

Space for rough work

6. The function $f(x)=\cos^{-1}(\cos x)$ is

(A) continuous at $x = \pi$ (B) Discontinuous at $x = \pi$

(C) Discontinuous at $x = -\pi$ (D) $f(x)=x, \forall x \in R$

7. Let $f(x)=\begin{cases} x & x<1 \\ 2-x & 1\le x\le 2 \\ -2+3x-x^2 & x>2 \end{cases}$ 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 $x = 0$

8. Let $f(x)=\begin{cases} x^2/2 & 0<x\le 1 \\ 2x^2-3x+3 & 1<x<2 \end{cases}$ then which is correct

(A) f si continuous in [0, 2] (B) f' is continuous in [0, 2]

(C) $f(x)$ is discontinuous at $x = 1$ (D) $\underset{x\to 1^+}{\text{Lt}} f(x)=\underset{x\to 1^-}{\text{Lt}} f(x)$

9. If $f(x)=\begin{cases} 1 & , \quad x<0 \\ 1+\sin x, & 0\le x<\frac{\pi}{2} \end{cases}$, then derivative of f(x) at $x = 0$

(A) is equal to 1 (B) is equal to 0 (C) is equal to -1 (D) does not exist

10. If $f(x)=\begin{cases} bx^2-a & , \text{ if } x<-1 \\ ax^2-bx-2 & , \text{ if } x\ge -1 \end{cases}$ if $f'(x)$ is continuous everywhere. Then the equation whose roots are a and b is

(A) $x^2+3x-2=0$ (B) $x^2-3x+2=0$

(C) $x^2+3x+2=0$ (D) $x^2-5x+6=0$

Space for rough work

CHAPTER: APPLICATIONS OF DERIVATIVES

11. 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

12. 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) $(5,9)$

13. 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

14. 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

15. The height of a cylinder is equal to its radius. If an error of 1 % is made in its height. Then the percentage error in its volume is

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

Space for rough work

CHAPTER: APPLICATIONS OF DERIVATIVES

16. 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) $(-11,6)$

17. The chord joining the points where x = p and x = q on the curve $y=ax^2+bx+c$ is parallel to the tangent at the point on the curve whose abscissa is

(A) $\frac{p+q}{2}$ (B) $\frac{p-q}{2}$ (C) $\frac{pq}{2}$ (D) $\frac{p}{2}$

18. The point on the curve $y=be^{\frac{-x}{a}}$ at which the tangent drawn is $\frac{x}{a}+\frac{y}{b}=1$ is

(A) (0, b) (B) $\left(a,\frac{1}{e}\right)$ (C) (0, 1) (D) (1, 0)

19. 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) $\frac{\pi}{2}$

20. 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

Space for rough work

CHAPTER: INDEFINITE INTEGRATION

21. If $\int \frac{dx}{x^4+5x^2+4} =$

$A\tan^{-1}x + B\tan^{-1}\left(\frac{x}{2}\right)+C,$ then B =

(A) 1/6 (B) −1/6 (C) 6 (D) −6

22. $\int x\tan x\sec^2 x\,dx =$

(A) $\frac{1}{2}\left[x\tan^2 x-\tan x+x\right]+c$

(B) $\frac{1}{2}\left[x\tan^2 x-\tan x-x\right]+c$

(C) $\frac{1}{2}\left[x\tan^2 x+\tan x-x\right]+c$

(D) $x\tan^2 x-\tan x+x+c$

23. If $\int \frac{6x+7}{(x+2)^2}dx = A\log|x+2|+\frac{B}{x+2}+c$ then $(A, B) =$

(A) $\left(6,\frac{1}{5}\right)$ (B) $(-6,-5)$ (C) $\left(\frac{1}{6},-5\right)$ (D) $(6, 5)$

24. If $\int \frac{x^2+4}{x^4+16}dx = \frac{1}{k}\tan^{-1}\left(\frac{x^2-4}{kx}\right)+c$ then $k =$

(A) $\sqrt{2}$ (B) $4\sqrt{2}$ (C) $2\sqrt{2}$ (D) 2

25. $\int \frac{\ln(\tan x)}{\sin x\cos x}dx$ is equal to

(A) $\frac{1}{2}\ln(\tan x)+c$ (B) $\frac{1}{2}\ln(\tan^2 x)+c$ (C) $\frac{1}{2}(\ln(\tan x))^2+c$ (D) None of these

Space for rough work

CHAPTER: DIFFERENTIATION

26. If x = a cos t, y = a sin t, then $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{4}$ is

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

27. Let $f(x) = x + \cos x + 2$ and $g(x)$ be the inverse function of f(x). Then $g'(3) =$

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

28. Given $y = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$ then $\left(\frac{d^5y}{dx^5}\right)_{x=0} =$

(A) 84 (B) 48 (C) 12 (D) $-\frac{1}{12}$

29. If $(x-2)y = (x-1)^{-3}$ then $\left(\frac{d^3y}{dx^3}\right)_{x=0} =$

(A) $\frac{3}{111}$ (B) $\frac{111}{3}$ (C) $\frac{8}{333}$ (D) $\frac{333}{8}$

30. If $y = (\sin^{-1}x)^2$ then

(A) $\frac{d^2y}{dx^2} + \frac{x}{(1-x^2)}\frac{dy}{dx} + 2 = 0$ (B) $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - 2 = 0$

(C) $y'' + y' + \frac{x}{(1-x^2)} = 0$ (D) $y'' - y' - 1 = 0$

Space for rough work

INTEGER TYPE QUESTIONS

1. The fuel charges for running a train are proportional to the square of the speed generated in m.p.h. & costs Rs. 48/- per hour at 16 mph. What is the most economical speed if the fixed charges i.e. salaries etc. amount to Rs. 300/- per hour.

Answer: ☐

2. A right circular cone is to be circumscribed about a sphere of a given radius. Find the ratio of the altitude of the cone to the radius of the sphere, if the cone is of least possible volume.

Answer: ☐

3. Let f(x) be a continuous function defined for $1 \le x \le 3$. If f(x) takes rational values for all x and f(2) = 10, then f(1.5) = ________.

Answer: ☐

Space for rough work

OMR

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