MODEL QUESTION PAPER (TERM - 2)

CLASS - +2

SUBJECT - MATHEMATICS

Time : 3 hours **M.M. : 50**

1. The antiderivative of $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)$ equals 1

(a) $\frac{1}{3}x^{1/3}+2x^{1/2}+c$ (b) $\frac{2}{3}x^{2/3}+\frac{1}{x}x^{2}+c$

(c) $\frac{2}{3}x^{3/2}+2x^{1/2}+c$ (d) $\frac{3}{2}x^{3/2}+\frac{1}{2}x^{1/2}+c$

2. If $\frac{d}{dx}f(x)=4x^3-\frac{3}{x^4}$ such that $f(2)=0$ then $f(x)$ is 1

(a) $x^4+\frac{1}{x^4}-\frac{129}{8}$ (b) $x^3+\frac{1}{x^4}+\frac{129}{8}$

(c) $x^4+\frac{1}{x^3}+\frac{129}{8}$ (d) $x^3+\frac{1}{x^4}-\frac{129}{8}$

3. $\int\frac{\sin^2 x-\cos^2 x}{\sin^2 x\ \cos^2 x}\,dx$ is equal to 1

(a) $\tan x+\cot x+c$ (b) $\tan x+\operatorname{cosec} x+c$

(c) $-\tan x+\cot x+c$ (d) $\tan x+\sec x+c$

4. $\int\frac{e^x(1+x)}{\cos^2(e^x x)}\,dx$ 1

(a) $-\cot(ex^x)+c$ (b) $\tan(x\,e^x)+c$

(c) $\tan(e^x)+c$ (d) $\cot e^x+c$

5. $\int\frac{dx}{x^2+2x+2}$ equals 1

(a) $x\tan^{-1}(x+1)+c$ (b) $\tan^{-1}(x+1)+c$

(b) $(x+1)\tan^{-1}+c$ (d) $\tan^{-1}x+c$

6. $\int\frac{dx}{x(x^2+1)}$ equals 1

(a) $\log|x|-\frac{1}{2}\log(x^2+1)+c$

(b) $\log|x|+\frac{1}{2}\log(x^2+1)+c$

(c) $-\log|x|+\frac{1}{2}\log(x^2+1)+c$

(d) $\frac{1}{2}\log|x|+\log(x^2+1)+c$

7. $\int_0^{2/3}\frac{dx}{4+9x^2}$ equals 1

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{12}$

(c) $\frac{\pi}{24}$ (d) $\frac{\pi}{4}$

8. Area of region bounded by the curve $y^2 = 4x$, y-axis and the line $y = 3$ is 1

(a) 2 (b) $\frac{9}{4}$

(c) $\frac{9}{3}$ (d) $\frac{9}{2}$

9. The order of the differential equation 1

$$2x^2 \frac{d^2y}{dx^2} - 3\frac{dy}{dx} + y = 0 \text{ is}$$

(a) 2 (b) 1

(c) 0 (d) not defined

10. Which of the following differential euqations has $y = x$ as one of its particlar solution ? 1

(a) $\frac{d^2y}{dx^2} - x^2 \frac{dy}{dx} + xy = x$

(b) $\frac{d^2y}{dx^2} + x\frac{dy}{dx} + xy = x$

(c) $\frac{d^2y}{dx^2} - x^2 \frac{dy}{dx} + xy = 0$

(d) $\frac{d^2y}{dx^2} + x^2 \frac{dy}{dx} + xy = 0$

11. The Integrating factor of the differential equation $x\frac{dy}{dx} - y = 2x^2$ is 1

12. Let the vectors $\vec{a}$ & $\vec{b}$ be such that $|\vec{a}| = 3$ and $|\vec{b}| = \frac{\sqrt{2}}{3}$, then $\vec{a} \times \vec{b}$ is a unit vector, if the angle between $\vec{a}$ and $\vec{b}$ is 1

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$

(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

13. If $\vec{a}$ is a non zero vector of magnitude 'a' and a a non-zero scalor, then $\gamma \vec{a}$ is unit vector if

(a) g = 1 (b) g = –1

(c) a = | g | (d) $a = \frac{1}{|\gamma|}$

14. The cross product of two vectors $\vec{a}$ and $\vec{b}$ is

(a) $|\vec{a}||\vec{b}| \sin\theta\, \hat{n}$ (b) $|\vec{a}| = |\vec{b}| \sin\theta\, \hat{n}$

(c) $|\vec{a}| = |\vec{b}| \tan\theta\, \hat{n}$ (d) None of these

15. The distance of the plane $x + 2y - 2z = 9$ from the point (2, 3 –5) is 1

(a) 3 (b) 4

(c) 0 (d) 5

16. Direction cosines of x-axis are 1

(a) (0, 0, 1) (b) (1, 0, 0)

(b) (0, 1, 0) (d) none of these

17. The planes $2x + y + 3z - 2 = 0$ and $x - 2y + 5 = 0$ are

(a) parallel (b) perpendicular

(c) intersecting (d) none of these

18. Three coins are tossed once, probability of getting atmost 2 heads is 1

(b) $\frac{7}{8}$ (b) $\frac{3}{8}$

(c) $\frac{1}{2}$ (d) $\frac{3}{4}$

19. If $P(A) = \frac{2}{3}$, $P(B) = \frac{7}{15}$ and $P(A \cap B) = \frac{1}{5}$ then P (A or B) is 1

(a) $\frac{17}{15}$ (b) $\frac{14}{15}$

(c) $\frac{20}{15}$ (d) $\frac{4}{3}$

20. If $P(A) = \frac{1}{2}$, $P(B) = 0$ then $P(A/B)$ is 1

(a) 0 (b) $\frac{1}{2}$

(c) not defined (d) 1

21. Evaluate $\int \frac{x+3}{\sqrt{5-4x-x^2}} dx$ 3

Or

$$\int_0^4 |x-1| \, dx$$

22. Solve differential euation. 3

$$x\frac{dy}{dx} + 2y + x^2 \log x$$

Or

Solve the differential equation and find the particular solution satisfying given condition $(x + y)\,dy + (x - y)\,dx = 0$; $y = 1$ when $x = 1$

23. Find ɡ if $\hat{i} - \hat{j} + \hat{k},\ 3\hat{i} + \hat{j} + 2\hat{k}$ and $\hat{i} + \gamma\hat{j} - 3\hat{k}$ are coplanar. 3

24. Find the angle between two planes $3x - 6y + 2z = 7$ and $2x + 2y - 2z = 5$ 3

25. Find the shortest distance between the lines 3

$$\vec{r} = (\hat{i} + 2\hat{j} + \hat{k}) + \lambda(\hat{i} - \hat{j} + \hat{k})$$

$$\vec{r} = (2\hat{i} - \hat{j} - \hat{k}) + \mu(2\hat{i} - \hat{j} + 2\hat{k})$$

26. From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with peplacement. Find the probability distribution of the number of defective bulbs. 3

Or

If a fair coin is tossed 10 times. Find the probability of :

(a) exactly six heads

(b) at least six heads

27. Find the area of region bounded by the ellipse

$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$ 6

Or

Using integration find the area of region bounded by triangle whose vertices are A (–1, 0), B (1, 3) and C (3, 2)

28. Maximize, $z = 5x + 10y$ subject to constraints. 6

$x + 2y \leq 120$

$x + y \geq 60$

$x - 2y \geq 0$

$x, y \geq 0$

Graphically.