

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) $-\cot(e^x) + c$ (b) $\tan(xe^x) + c$
- (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) $\tan^{-1}(x+1) + c$
- (c) $(x+1) \tan^{-1} + c$ (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 $2x^2 \frac{d^2y}{dx^2} - 3 \frac{dy}{dx} + y = 0$ is 1
- (a) 2 (b) 1
 (c) 0 (d) not defined
10. Which of the following differential equations has $y = x$ as one of its particular 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 ' γ ' and a non-zero scalar, then $\gamma \vec{a}$ is unit vector if
- (a) $\gamma = 1$ (b) $\gamma = -1$
 (c) $a = |\gamma|$ (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
- | | | |
|-------|-------|---|
| (a) 3 | (b) 4 | 1 |
| (c) 0 | (d) 5 | |
16. Direction cosines of x -axis are
- | | | |
|-----------------|-------------------|---|
| (a) $(0, 0, 1)$ | (b) $(1, 0, 0)$ | 1 |
| (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
- | | |
|-------------------|-------------------|
| (a) $\frac{7}{8}$ | (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 $P(A \text{ or } B)$ is
- | | |
|---------------------|---------------------|
| (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
- | | | |
|-----------------|-------------------|---|
| (a) 0 | (b) $\frac{1}{2}$ | 1 |
| (c) not defined | (d) 1 | |
21. Evaluate $\int \frac{x+3}{\sqrt{5-4x-x^2}} dx$
- Or
22. Solve differential equation.
- $$\int_0^4 |x-1| dx$$
- 3
23. Find g 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

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

25. Find the shortest distance between the lines 3

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

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

26. From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with replacement. 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

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

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.