

**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)  $-\cot(e^x x) + c$  (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)  $\tan^{-1}(x+1) + c$   
(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 'a' 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 1  
 (a) 3 (b) 4  
 (c) 0 (d) 5
16. Direction cosines of  $x$ -axis are 1  
 (a)  $(0, 0, 1)$  (b)  $(1, 0, 0)$   
 (c)  $(0, 1, 0)$  (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  
 (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  $P(A \cup B)$  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 equation. 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  $g$  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

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 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.