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II UNIT TEST 2019-20

SUB – MATHEMATICS

CLASS – XII

Time – 1 hours 30 minutes

Maximum Marks – 50

Note - 1. All question are compulsory

2. Section A contain 10 question of 1 marks each

3. Section B contain 3 question of 2 marks each

4. Section C contains 4 question of 4 marks each

5. Section D contains 3 question of 6 marks each

1. The edge of a cube is increasing at the rate of 0.3 cm/sec the rate of change if its surface areas when edge is 3 cm is

(a)  $12 \text{ cm}^2/\text{sec}$  (b)  $12.8 \text{ cm}^2/\text{sec}$  (c)  $10.8 \text{ cm}^2/\text{sec}$  (d)  $5 \text{ cm}^2/\text{sec}$

2. The equation of normal to the curve  $y = \sin x$  at  $(0,0)$  is

(a)  $x = 0$  (b)  $y = 0$  (c)  $x + y = 0$  (d)  $x - y = 0$

3.  $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\sin x}$  equal to

(a) 0 (b)  $\frac{1}{2}$  (c) 1 (d)  $\frac{3}{2}$

4. The area enclosed by the curve  $y = x^2$  and  $y = 8$  is

(a)  $\frac{64\sqrt{2}}{3}$  sq unit (b)  $\frac{32}{3}\sqrt{2}$  sq unit

(c) 0 (d)  $\frac{16}{3}\sqrt{2}$  sq unit

5. The differential equation of the family of lines passing through origin is

(a)  $y = mx$  (b)  $\frac{dy}{dx} = m$  (c)  $\frac{dy}{dx} = 0$  (d)  $x dy - y dx = 0$

6. The Magnitude of projection of  $(2\mathbf{i} - \mathbf{j} + \mathbf{k})$  on  $(\mathbf{i} - 2\mathbf{j} + 2\mathbf{k})$  is.....
7. General solution of differential equation  $\frac{dy}{dx} = e^{x+y}$  is .....
8. If  $|a|=8$ ,  $|b|=3$  and  $|\vec{a} - \vec{b}| = 12\sqrt{3}$  then the value of  $|\vec{a} \times \vec{b}|$  is
9.  $\int_{-1}^1 (1-x)dx$  is equal to .....
10. Area of region bounded by the curve  $x = 2y + 3$  the  $y$  axis is and between  $y = -1$  and  $y = 1$  is .....

### Section B

11. Evaluate  $\int_0^{\pi/2} \frac{\sin x dx}{1+\cos^2 x}$
12. Solve differential equation  $\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0$
13. Find value of  $\lambda$  for which  $2\mathbf{i} - 4\mathbf{j} + 5\mathbf{k}$  and  $3\mathbf{i} - 2\mathbf{j} + 2\lambda\mathbf{k}$  are perpendicular to each other.

### Section - C

14. Find the intervals in which  $f(x) = \sin x + \cos x$  is increasing or decreasing  $0 \leq x \leq 2\pi$
15. By using properties of definite integrals evaluate:-

$$\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$$

OR

$$\int_0^{\pi/2} \log(1 + \tan x) dx$$

16. Find particular solution satisfying the given condition -  
 $(x + y)dy + (x - y)dx = 0$   $y = 1$  when  $x = 1$ .

17. If  $\vec{a}, \vec{b}, \vec{c}$  are unit vectors such that  $\vec{a} + \vec{b} + \vec{c} = 0$  find the value of  $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$

Or

For three non zero vectors  $\vec{a}, \vec{b}$  and  $\vec{c}$  prove that

$$[\vec{a} - \vec{b} \quad \vec{b} - \vec{c} \quad \vec{c} - \vec{a}] = 0$$

### Section -D

18. Prove that the volume of largest cone that can be inscribed in a sphere of radius R is  $\frac{8}{27}$  of the volume of sphere

or

Show that the triangle of maximum area that can be inscribed in a given circle is an equilateral triangle.

19. Evaluate  $\int_0^{\pi/2} \log \sin x \, dx$

20. Find the area bounded by  $(x - 1)^2 + y^2 = 1$  and  $x^2 + y^2 = 1$  by method of integration

or

Find the area bounded by the circle  $x^2 + y^2 = 16$  and the line  $\sqrt{3}y = x$  in the first quadrant, using integration.

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