Seat No. : _____

SARDAR PATEL UNIVERSITY

No. of pages: 02

B.Sc. (II-Semester) ON DEMAND EXAMINATION 2022

[I(A)/A-I(A)]

Tuesday, 11 th October



09:30am-11:30am

US02EMTH 02-Mathematics

MATHEMATICS

Total Marks: 70

Note: Figures to the right indicates full marks of question.

Q: 1 Answer the following by selecting the correct answer from the given options:

[10]

- 1. $\lim_{x\to 6} 8(x-5)(x-7) = ---$
 - a. 8

b. -5

c -7

d. -8

- $2. \quad \frac{d}{dx} \left(a^x \right) = ---$
 - a. *a*^x

- b. $a^x \log_a e$
- c. $a^x \log_e a$
- d. None of these

- 3. $\lim_{x\to 0} \frac{\sin kx}{3x} = \frac{1}{5}$ then k = ---
 - a. 15

b. 5/3

c. 1/5

- d. 3/5
- 4. For any point on circle $x^2 + y^2 = a^2$ then $\int (x^2 + y^2) dx =$
 - a. ax + c
- b. 0

- c. $a^2x + c$
- d. None of these

- 5. $\int cosec^2x dx = --$
 - a. cotx

- b. tanx
- c. -cotx
- d. -tanx

- 6. If $\int f(x)dx = x$ then $\int \sin x f(x)dx =$
 - a. xsinx cosx
- b. sinx

- c. -cosx
- d. cosx

- 7. $\int_{-a}^{a} x^3 dx = ---$
 - a. $\frac{2}{3}$

b. 0

c. $\frac{2}{3}x^3$

d. None of these

- 8. If $f(x) = \int_0^{\pi} x dx$ then f(0) + f(1) + f(2) = ------
 - a. 0

b. $\frac{1}{2}$

c. $\frac{5}{2}$

d. None of these

- 9. $y = ce^x$ is solution of the differential equation ----
 - a. y'=y
- b. xy' = 2y
- c. $xy' = x^2 + y$
- d. None of these

- 10. The order and degree of differential equation $\sqrt[3]{\frac{d^2y}{dx^2}} = \sqrt{\frac{dy}{dx}}$
 - a. 1, 2

b. 2, 1

c. 1, 3

d. 2, 2

Q: 2 Do as directed:

[08]

$$(1) \frac{d}{dx} (\sqrt[3]{x}) = ---$$

$$(2) \frac{d}{dx} \left(x^{sinx} \right) = ----$$

(3) True or False: $\int \tan^{-1} x dx$ is obtained by the method of Integration by parts.

(4) True or False: If
$$\int f(x)dx = \frac{x^{n+1}}{n+1}$$
 then $f(x) = (n+1)x^n$

(5) True or False:
$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} cosx dx = 0$$

(6) True or False:
$$\int_{a}^{b} f(x)dx + \int_{b}^{a} f(x)dx = 0$$

(7) The solution of the differential equation obtained by taking particular value of the constant is called----

(8) If a,b,c are arbitrary constant then order of differential equation is----where solution is y = $acosx + bsinx + ce^{-x}$

Q: 3 Answer in brief of the following questions. (Any Ten)

[20]

1. Find
$$\lim_{x\to 0} \frac{\sin 5x - \sin 7x}{\sin x}$$

2. Find
$$\lim_{x \to 3} \frac{x^{\frac{3}{2}} - 3^{\frac{3}{2}}}{x - 3} \quad x \in R - \{3\}$$

3. Find derivative of $x^3 + y^3 = 3axy$

4. Evaluate:
$$\int \left(\frac{x}{a} + a^x + x^a + ax\right) dx$$

5. Evaluate:
$$\int x e^x dx$$

6. Evaluate:
$$\frac{1}{4x^2+9}dx$$

7. State the working rules of definite integration.

8. Find the value of
$$\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sin^2 x dx$$

9. Prove that
$$\int_1^e logx dx = 1$$

10. Obtain the differential equation representing all lines of family y = 2x + c, where c is arbitrary constant.

11. Verify that $e^x + logy = 0$, $x \in R$ is a solution of the differential equation $\frac{dy}{dx} + e^x y = 0$

12. Solve: xdy - ydx = 0

Q: 4 Attempt any Four of the following:

[32]

(1)Find the limit: (i) $\lim_{x \to 2} \frac{x^2 - 4}{\sqrt{x + 2} - \sqrt{3x - 2}}$ (i) $\frac{d}{dx}(x^4)$

 $(ii)\lim_{x\to 0}\frac{1-\cos x}{x^2}$

By using the definition find:

 $(ii)\frac{d}{dx}(\sqrt{x})$

(3) Evaluate:

 $(i) \int \frac{\cos x}{\cos x - 1} \, dx$

(ii) $\int \frac{x^3 + 3x^2 + 4}{\sqrt{x}} dx \ x > 0$

(4) Evaluate:

 $(i) \int (2+7x)\cos 6x dx$

(ii) $\int x \log x dx$

(5) Evaluate:

 $(ii) \int_0^2 \frac{6x+3}{x^2+4} dx$

(6) Evaluate:

 $(i) \int_{\frac{\pi}{2}}^{\pi} \frac{1-\sin x}{1-\cos x} dx$ $(i) \int_{0}^{\frac{\pi}{4}} \frac{dx}{4\sin^{2}x+5\cos^{2}x}$

 $(ii) \int_0^{2a} \frac{f(x)}{f(x) + f(2a - x)} dx$

(7) Solve the differential equation $\frac{dy}{dx} = e^{x+y}$. Find the particular solution subject to initial condition y(1) = 1, also find y(-1).

(8) Solve:
$$\frac{dy}{dx} = \sin(x + y)$$