SNS ACADEMY

Split 1

12th Standard CBSE

Date : 12-Feb-22

Maths

Reg.No. : | | | | | | |

Exam Time : 00:03:00 Hrs

Total Marks : 80

20 x 1 = 20

1) A relation S in the set of real numbers is defined as xSy ⇒ x – y+ $\sqrt{3}$ is an irrational number, then relation S is

(a) reflexive (b) reflexive and symmetric (c) transitive (d) symmetric and transitive

2) $\tan^{-1}\{\sin(-\frac{\pi}{2})\}$ is equal to

(a) -1 (b) 1 (c) $\frac{\pi}{2}$ (d) $-\frac{\pi}{4}$

3) The domain of the function y = $\sin^{-1}(x^2)$ is

(a) [0, 1] (b) (0, 1) (c) [-1, 1] (d) Φ

4) If A is a square matrix such that $A^2=A$, then $(I + A)^2 - 3A$ is

(a) I (b) 2A (c) 3I (d) A

5) $\int \frac{1}{sin^2xcos^2x}dx$ is equal to

(a) $\sin^2 x - \cos^2 x + C$ (b) -1 (c) tan x + cot x + C (d) tan x – cot x + C

6) Let $I_1 = \int_1^2 \frac{dx}{\sqrt{1+x^2}}$ and $I_2 = \int_1^2 \frac{dx}{x}$, then

(a) $I_1 > I_2$ (b) $I_2 > I_1$ (c) $I_1 = I_2$ (d) $I_1 > 2I_2$

7) Area of the region bounded by the curve y = $\sqrt{49-x^2}$ and the x-axis is

(a) $\frac{49}{2}\pi$ sq units (b) 98π sq units (c) 49π sq units (d) 240π sq units

8) Area of the region bounded by the curve x = 2y + 3, the y-axis and between y = -1 and y = 1 is

(a) 4 sq units 3 (b) $\frac{3}{2}$ (c) 6 sq units (d) 8 sq units

9) The degree of the differential equation $\frac{d^2y}{dx^2}+3\left(\frac{dy}{dx}\right)^2 = x^2log\left(\frac{d^2y}{dx^2}\right)$

(a) 1 (b) 2 (c) 3 (d) not defined

10) For what real value of y will matrix A be equal to matrix B, where

$A = \begin{bmatrix} 3x-4 & 5y \\ 8 & y^2-4y \end{bmatrix}; B = \begin{bmatrix} x+1 & 6y^2+1 \\ 8 & -3 \end{bmatrix}$

(a) 1, 3 (b) No real value (c) 1/3, 1/2 (d) 2 and 3

11) Evaluate $\int(2x^2 - 3sinx + 5\sqrt{x})dx$

(a) $\frac{2}{3}x^2 - 3cosx - \frac{10}{3}x^{\frac{3}{2}} + C$ (b) $\frac{2}{3}x^2 - 3cosx + \frac{10}{3}x^{\frac{3}{2}} + C$ (c) $\frac{2}{3}x^2 + 3cosx - \frac{10}{3}x^{\frac{3}{2}} + C$

(d) $\frac{2}{3}x^2 + 3cosx + \frac{10}{3}x^{\frac{3}{2}} + C$

12) Area of the region bounded by the curve $y^2 = 2y - x$ and y-axis is:

(a) 4/3 sq. units (b) 3/4 sq. units (c) 4 sq. units (d) 3 sq. units

13) Formation of the differential equation of the family of curves represented by $y = Ae^{2x} + Be^{-2x}$ is:

(a) $\frac{d^2y}{dx^2} - 4y = 0$ (b) $\frac{d^2y}{dx^2} - 4y = 0$ (c) $\frac{dy}{dx} = 2y$ (d) $\frac{d^2y}{dx^2} + 4y = 0$

14) The anti-derivative of $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)$ equal to

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

15) $\int \frac{2x^3-1}{x+x^4}$ is equal to

(a) $\log\left(x^4 + x\right) + C$ (b) $\log\left(\frac{x^3+1}{x}\right) + C$ (c) $\frac{1}{2}\log\left(x^2 + \frac{1}{x^2}\right) + C$ (d) None of these

16) $\int \sin(\log x) + \cos(\log x)dx$ equals

(a) $x\sin(\log x) + C$ (b) $x\cos(\log x) + C$ (c) $\frac{1}{x}\cos(\log x) + C$ (d) $\frac{1}{x}\sin(\log x) + C$

17) $\int x^2 e^{x^3} dx$ is equal to

(a) $\frac{1}{3}e^{x^3} + C$ (b) $\frac{1}{3}e^{x^2} + C$ (c) $\frac{1}{2}e^{x^3} + E$ (d) $\frac{1}{2}e^{x^2} + C$

18) The area of the region bounded by parabola $y^2 = x$ and the straight line 2y = x is

(a) $\frac{4}{3}$ sq units (b) 1 sq unit (c) $\frac{2}{3}$squnit (d) $\frac{1}{3}$ sq unit

19) The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/4} + x^{1/5} = 0$,respectively, are

(a) 2 and 4 (b) 2 and 2 (c) 2 and 3 (d) 3 and 3

20) The integrating factor of differential equation $\frac{dy}{dx} + y\tan x - \sec x = 0$ is

(a) cos x (b) secx (c) e^{COSX} (d) e^{secx}

7 x 2 = 14

21) If is $A = \begin{bmatrix} 0 & b & -2 \\ 3 & 1 & 3 \\ 2a & 3 & -1 \end{bmatrix}$ skew symmetric matrix, find the values of a and b.

22) Let $f(x) = \begin{bmatrix} cosx & -sinx & 0 \\ sinx & cosx & 0 \\ 0 & 0 & 1 \end{bmatrix}$ Show that f(x)f(y)=f(x+y).

23) $\int sin2xcos3xdx$

24) $\int tan^{-1}\sqrt{\frac{1-cos2x}{1+cos2x}}dx$

25) Let f: $R \rightarrow R$ be defined by $f(X) = X^2 + 1$ Find the pre-image of (i) 17 (ii) -3.

26) Find the general solution of the following differential equation.

$\log\left(\frac{dy}{dx}\right) = 3x + 4y$

27) Find the area of the region bounded by the parabola $y = x^2$ and $y = |x|$

6 x 3 = 18

28) Sketch the graph of $y = |x+3|$ and evaluate $\int_{-6}^{0} |x+3|\,dx$

29) Find: $\int \frac{x^2}{(x^2+1)(x^2+4)}dx$

30) Evaluate $\int \tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right)dx$

31) The value of $\tan^{-1}\left(\frac{-1}{\sqrt{3}}\right) + \cot^{-1}\left(\frac{1}{\sqrt{3}}\right) + \tan^{-1}\left(\sin\left(-\frac{\pi}{2}\right)\right)$ is

32) Show that the differential equation (x - y) $\frac{dy}{dx}$ = x + 2y is homogeneous and solve it.

33) Let A=R-{3} and B=R-{1} Consider the function $f : A \to B$ be defined by:
$f(x) = \left(\frac{x-2}{x-3}\right)$.
Is f one-one and onto? Justify your answer.

4 x 5 = 20

34) Evaluate the integral: $\int \frac{x+2}{\sqrt{(x-2)(x-3)}}dx$

35) Evaluate the integral: $\int_0^{\pi} \frac{x\ tan\ x}{sec\ x + tan\ x}dx$.

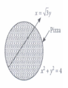
36) Find the area of the region included between the parabola $y = \frac{3}{4}x^2$ and the line 3x - 2y + 12 =0.

37) Solve the differential equation
$x\frac{dy}{dx} + y = x\cos x + \sin x$, given $y\left(\frac{\pi}{2}\right) = 1$

2 x 5 = 10

38) A relation R on a set A is said to be an equivalence relation on A iff it is
(a) Reflexive i.e.., $(a, a) \in R\,\forall\, a \in A$
(b) Symmetric i.e., $(a, b) \in R \Rightarrow (b, a) \in R\,\forall\, a, b \in A$
(c) Transitive i.e., $(a, b) \in R$ and $(b, c) \in R \Rightarrow (a, c) \in R\,\forall\, a, b, c \in A$
Based on the above information, answer the following questions.
(i) If the relation R = {(1, 1), (1, 2), (1, 3), (2,2), (2, 3), (3,1), (3, 2), (3, 3)} defined on the set A = {1, 2, 3}, then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence
(ii) If the relation R = {(1, 2), (2,1), (1, 3), (3, I)} defined on the setA = {1, 2, 3}, then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence
(iii) If the relation R on the set N of all natural numbers defined as R = {(x, y) : y = x + 5 and x < 4}, then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence
(iv) If the relation R on the set A = {1, 2, 3, , 13, 14}defined as R = {(x, y) : 3x - y = 0}, then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence

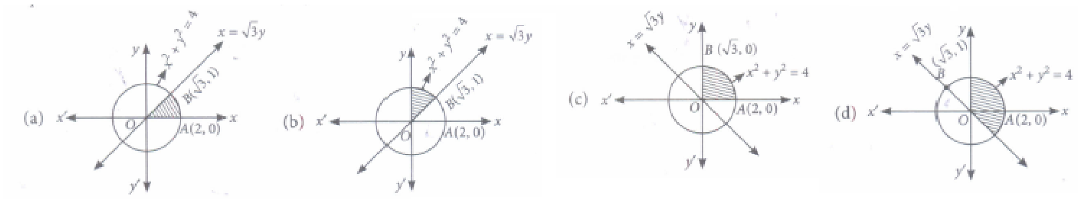
39) A child cut a pizza with a knife. Pizza is circular in shape which is represented by knife represents a straight line given by $x = \sqrt{3}y$.
Based on the above information, answer the following questions

(i) The point(s) of intersection of the edge of knife (line) and pizza shown in the figure is (are)

(a) $(1, \sqrt{3}), (-1, -\sqrt{3})$ **(b)** $(\sqrt{3}, 1), (-\sqrt{3}, -1)$ **(c)** $(\sqrt{2}, 0), (0, \sqrt{3})$ **(d)** $(-\sqrt{3}, 1), (1, -\sqrt{3})$

(ii) Which of the following shaded portion represent the smaller area bounded by pizza and edge of knife in first quadrant?



(iii) Value of area of the region bounded by circular pizza and edge of knife in first quadrant is

(a) $\frac{\pi}{2}$ sq. units **(b)** $\frac{\pi}{3}$ sq. units **(c)** $\frac{\pi}{5}$ sq. units **(d)** π sq. units

(iv) Area of each slice of pizza when child cut the pizza into 4 equal pieces is

(a) π sq. units **(b)** $\frac{\pi}{2}$sq. units **(c)** 3π sq. units **(d)** 2π sq. units

(v) Area of whole pizza is

(a) 3π sq. units **(b)** 2π sq. units **(c)** 5π sq. units **(d)** 4π sq. units

1 x 1 = 1

40) If the equation is of the form $\frac{dy}{dx} + Py = Q$,where P, Q are functions of x, then the solution of the differential equation is given by $ye^{\int Pdx} = \int Qe^{\int Pdx}\,dx + c$,where $e^{\int Pdx}$ is called the integrating factor (I.F.).

Based on the above information, answer the following questions.

(i) The integrating factor of the differential equation$\sin x \frac{dy}{dx} + 2y\cos x = 1$ is $(\sin x)^{\lambda}$, where $\lambda =$

(a) 0 **(b) 1** **(c) 2** **(d) 3**

(ii) Integrating factor of the differential equation $\left(1 - x^2\right)\frac{dy}{dx} - xy = 1$ is

(a) -x **(b)** $\frac{x}{1+x^2}$ **(c)** $\sqrt{1 - x^2}$ **(d)** $\frac{1}{2}\log\left(1 - x^2\right)$

(iii) The solution of $\frac{dy}{dx} + y = e^{-x}, y(0) = 0$ is

(a) $y = e^{x}(x - 1)$ **(b)** $y = xe^{-x}$ **(c)** $y = xe^{-x} + 1$ **(d)** $y = (x + 1)e^{-x}$

(iv) General solution of $\frac{dy}{dx} + y\tan x = \sec x$ is

(a) y see x = tan x + c **(b) y tan x = sec x + c** **(c) tan x = y tan x + c** **(d) x see x = tan y + c**

(v) The integrating factor of differential equation $\frac{dy}{dx} - 3y = \sin 2x$ is

(a) e^{3x} **(b)** e^{-2x} **(c)** e^{-3x} **(d)** xe^{-3x}

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