Class : 1

FIRST REVISION EXAMINATION 2019-20

Time Allowed : 3.00 Hours] **MATHEMATICS** **[Max. Marks : 90**

INSTRUCTION : **1.Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.**
2. Use Blue or Black ink to write and underline and Pencil to draw diagrams.

Part - A

Note (i) Answer All the questions. **20×1=20**
(ii) Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer.

1. A random variance X has binomial distribution with n = 25 and p = 0.8 then standard deviation of X is
   (a) 6 (b) 4 (c) 3 (d) 2

2. The operation * defined by $a*b = \frac{ab}{7}$ is not a binory operation on
   a) Q^+ (b) Z (c) R (d) C

3. Let $A = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ be any two boolean matrices of the same type. then AVB =
   (a) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

4. If the direction cosines of a line are $\frac{1}{c}, \frac{1}{c}, \frac{1}{c}$ then
   a) $C = \pm 3$ b) $C = \pm \sqrt{3}$ c) $C > 0$ d) $0 < C < 1$

5. The Principal value of $(\sin 40^\circ + i \cos 40^\circ)^5$ is
   (a) -110° (b) $-\frac{2\pi}{3}$ (c) 70° (d) 110°

6. Which one is not true
   (a) $(\vec{a} \times \vec{b}) \times \vec{c} = -\vec{c} \times (\vec{a} \times \vec{b})$ (b) $[\vec{a} - \vec{b}, \vec{b} - \vec{c}, \vec{c} - \vec{a}] = 0$
   (c) $[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}] = [\vec{a}\ \vec{b}\ \vec{c}]^2$ (d) $\vec{a} \times \vec{b} = \vec{b} \times \vec{a}$

7. If A is a non - singular matrix such that $A^{-1} = \begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$ then $(A^T)^{-1}$ =
   (a) $\begin{bmatrix} -5 & 3 \\ 2 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$ (c) $\begin{bmatrix} -1 & -3 \\ 2 & 5 \end{bmatrix}$ (d) $\begin{bmatrix} 5 & -2 \\ 3 & -1 \end{bmatrix}$

8. The domain of the function defined by $f(x) = \sin^{-1}\sqrt{x-1}$ is
   (a) [1,2] (b) $[-1,1]$ (c) [0,1] (d) [-1,0]

9. $i^{2020} + i^{-2020}$ =
   a) 1 b) -1 + i c) 2-i d) 2

10. A zero of $x^3 + 64$ is
    (a) 0 (b) 4 (c) 4i (d) -4

11. The angle between two curves $y^2 = x$ and $x^2 = y$ at origin is

(a) $\tan^{-1}\left(\frac{3}{4}\right)$ (b) $\tan^{-1}\left(\frac{4}{3}\right)$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$

12. The value of $\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x$ is :

(a) $\sqrt{e}$ (b) $-\sqrt{e}$ (c) e (d) -e

13. Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

(a) 2ab (b) ab (c) $\sqrt{ab}$ (d) $\frac{a}{b}$

14. If $V(x,y) = \log(e^x + e^y)$ then value of $\frac{\partial v}{\partial x} + \frac{\partial v}{\partial y}$ is

a) $e^x + e^y$ b) $\frac{1}{e^x + e^y}$ c) 2 d)

15. The intagrating factor of the differential equation $\frac{dy}{dx} = \frac{x + y + 1}{x + 1}$

(a) $\frac{1}{x + 1}$ (b) $x + 1$ (c) $\frac{1}{\sqrt{x + 1}}$ (d)

16. The degree and order of the differential equation respectively are

(a) 3,1 (b) 2,2 (c) 1,3 (d)

17. If $\int_0^a \frac{1}{4 + x^2} dx = \frac{\pi}{8}$ then the value of a is

(a) 4 (b) 1 (c) 3 (d) 2

18. $\int_0^{\pi} \begin{vmatrix} \cos^2 x & -1 \\ \sin^2 x & 1 \end{vmatrix} dx =$

a) $-\pi$ b) π c) $\pi/2$ d) $-\pi/2$

19. If $|\text{adj}(\text{adj}A)| = |A|^4$ then the order of the sqaure matrix A is

(a) 3 (b) 4 (c) 2 (d) 5

20. $[3] +_8 [7] =$

(a) [10] (b) [8] (c) [5] (d) [2]

PART – B

Note (i) Answer any Seven questions. **7X2= 14**

(ii) Question No.30 is compulsory and choose any nine from the remaining.

21. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is non - singular find A^{-1}.

22. Construct a cubic eqaution with roots 1,1 and -2.

23. Find $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$

24. Find $\vec{a} . (\vec{b} \times \vec{c})$ if $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$, $b = 2\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{c} = 3\hat{i} + 2\hat{j} + \hat{k}$.

25. If $|z| = 3$ then show that $7 \leq |z + 6-8i| \leq 13$.

26. The probability density function of X is given by $f(x) = \begin{cases} k \times e^{-3x} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$

27. If $g(x) = x^2 + \sin x$ then find dg

28. Evaluate $\int_0^1 [2x]\, dx$ where [.] is the greatest integer function.

29 Find the integrating factor of $\frac{dy}{dx} + \frac{y}{x} = \sin x$

30 $A = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$

PART – C

Note (i) Answer any seven questions. **7X3= 21**

(ii) Question No.40 is compulsory and choose any nine from the remaining

31. Find the asymptotes of the curve $f(x) = \frac{2x^2 - 8}{x^2 - 16}$

32. Find the vertices, foci for the hyperbola $9x^2 - 16y^2 = 144$

33. Find the inverse of $\begin{bmatrix} 2 & -1 \\ 5 & -2 \end{bmatrix}$ by Gauss - Jordan method.

34. Find the square root of -5-12i

35. If the two lines $\frac{x - 5}{5m+2} = \frac{2 - y}{5} = \frac{1 - z}{-1}$ and $x = \frac{2y + 1}{4m} = \frac{1 - z}{-3}$

then find the value of m.

36.

37.

38.

39.

40. Prove that $p \rightarrow q \equiv \neg pvq$ by truth table.

PART – D

Note (i) Answer All the questions. **7X5= 35**

41. (a) Find the paramatric form of vector quation and cortesian equation of the plane passing through the points (2,2,1), (9,3,6) and perpendicular to the plane $2x + 6y + 6z = 9$

(Or)

(b) The region enclosed by the circle $x^2 + y^2 = a^2$ is divided into two segments by the line $x = h$. find the area of the smaller segment.

(a) Solve by Gaussian - Elimination method. $2x + 3y + 3z = 5$, $x - 2y + z = -4$ and $3x - y - 2z = 3$.

(Or)

(b) Prove that $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \tan^{-1}\left[\frac{x + y + z - xyz}{1 - xy - yz - zx}\right]$

43. (a) Prove that the values of $\sqrt[4]{-1}$ are $\pm \frac{1}{\sqrt{2}}(1 \pm i)$

(Or)

(b) For the ellipse $4x^2+y^2+24x - 2y +21=0$, find the centre, vertices and the foci. Also prove that the length of the latus rectum is 2.

from the starting point. Find the angle of projection.

(Or)

(b) At 10.00 A.M a woman took a cup of hot instant coffee from her microwave oven and placed it on a nearby kitchen counter to cool. At this instant the tempeature of the coffee was 180°F and 10 minutes later it was160°F. Assume that constant temperature of the kitchen was 70°F.

(i) What was the temperature of the coffee at 10.15 A.M?

(ii) The woman likes to drinks coffee when its temperature is between 130°F and 140°F between what times should she have drunk the coffee?

46. (a) The mean and standard deviation of a binomial variate X are respectively 6 and 2. Find (i) the probability mass function. (ii) P (X=3) (iii) $P(X \geq 2)$

(Or)

(b) Verify : $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = [\vec{a}, \vec{c}, \vec{d}]\,\vec{b} - [\vec{b}\,\vec{c}\,\vec{d}]\,\vec{a}$ if $\vec{a} = \vec{i} + \vec{j} - \vec{k}$, $\vec{b} = i + 2\vec{j} - 3\vec{k}$, $\vec{c} = 2\vec{i} - 3\vec{j}$, $\vec{d} = 3\vec{i} + 4\vec{k}$

47. (a) Find the acute angle between the curves $y = x^2$ and $x = y^2$ at their points of intersection (0,0),(1,1)

(Or)

(b) If $u = \sin^{-1}\left[\frac{x + y}{\sqrt{x} + \sqrt{y}}\right]$ then prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{1}{2}\tan u$.