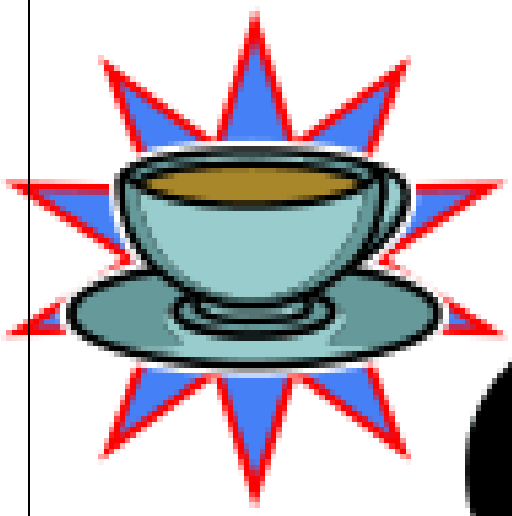

Math café

+2-QUESTION BANK

MODEL FULL PORTION TEST

PREPARED BY: E.PALAVESAM.M.Sc.,B.Ed.,

Math Café

Mathematics Time: 3.00Hrs.

STD: **XII** **MODEL FULL PORTION -2** Marks: **90**

PART-A

I. Choose the best Answers **20 x 1 =20**

1. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $\lambda A^{-1} = A$, then λ is

   (1) 17 (2) 14 (3) 19 (4) 21

2. If $P = \begin{bmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{bmatrix}$ is the adjoint of 3×3 matrix A and $|A| = 4$, then x is

   (1) 15 (2) 12 (3) 14 (4) 11

3. The value of $i^{2018} + i^{2019} + i^{2020} + i^{2021}$ is

   (1) 0 (2) 1 (3) - 1 (4) i

4. The solution of the equation $|z| - z = 1 + 2i$ is

   (1) $\frac{3}{2} - 2i$ (2) $-\frac{3}{2} + 2i$ (3) $2 - \frac{3}{2}i$ (4) $2 + \frac{3}{2}i$

5. A zero of $x^3 + 64$ is

   (1) 0 (2) 4 (3) $4i$ (4) -4

6. If $\sin^{-1}\frac{x}{5} + \text{cosec}^{-1}\frac{5}{4} = \frac{\pi}{2}$, then the value of x is

   (1) 4 (2) 5 (3) 3 (4) 2

7. If the function $f(x) = \sin^{-1}(x^2 - 3)$, then x belongs to

   (1) $[-1,1]$ (2) $[\sqrt{2}, 2]$ (3) $[-2, -\sqrt{2}] \cup [\sqrt{2}, 2]$ (4) $[-2, -\sqrt{2}]$

8. If $x + y = k$ is a normal to the parabola $y^2 = 12x$, then the value of k is

   (1) 3 (2) -1 (3) 9 (4) 1

9. The distance between the foci of the ellipse $9x^2 + 5y^2 = 180$ is

   (1) 2 (2) 4 (3) 6 (4) 8

10. If $[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}] = 121$ then $[\vec{a}, \vec{b}, \vec{c}] =$ is,

    (1) $\frac{121}{2}$ (2) 8 (3) 11 (4) 121

11. If $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$, $\vec{b} = \hat{\imath} + \hat{\jmath}$, $\vec{c} = \hat{\imath}$ and $(\vec{a} \times \vec{b}) \times \vec{c} = \lambda\vec{a} + \mu\vec{b}$, then the value of $\lambda + \mu$ is

    (1) 0 (2) 1 (3) 6 (4) 3

12. The minimum value of the function $|3 - x| + 9$ is

    (1) 0 (2) 3 (3) 6 (4) 9

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13. Angle between $y^2 = x$ and $x^2 = y$ at the origin is

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{6}$ (4) can't find

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

(1) $e^x + e^y$ (2) $\frac{1}{e^x + e^y}$ (3) 2 (4) 1

15. The value of $\int_{-4}^{4} |x + 3| dx$ is

(1) 50 (2) 25 (3) 16 (4) 8

16. The value of $\int_0^{\pi} \sin^4 x \, dx$ is

(1) $\frac{3\pi}{10}$ (2) $\frac{3\pi}{8}$ (3) $\frac{3\pi}{4}$ (4) $\frac{3\pi}{2}$

17. The general solution of the differential equation $\frac{dy}{dx} = \frac{y}{x}$ is

(1) $xy = k$ (2) $y = k\log x$ (3) $y = kx$ (4) $\log y = kx$

18. The solution of $\frac{dy}{dx} = 2^{y-x}$ is

(1) $2^x + 2^y = C$ (2) $2^x - 2^y = C$ (3) $\frac{1}{2^x} - \frac{1}{2^y} = C$ (4) $x + y = C$

19. If $U =$ y sinx, then $\frac{\partial^2 f}{\partial x \, \partial y}$ is equal to

(1) cos x (2) cos y (3) sin x (4) sin y

20. If $\frac{z-1}{z+1}$ is purely imaginary, then $|z|$ is

(1) $\frac{1}{2}$ (2) 1 (3) 2 (4) 3

PART-B

II. Answer any 7questions.(Q.no.30 is compulsory) **7 x 2 =14**

21. If $\text{adj}(A) = \begin{bmatrix} 0 & -2 & 0 \\ 6 & 2 & -6 \\ -3 & 0 & 6 \end{bmatrix}$, find A^{-1}.

22. Show that $(2 + i\sqrt{3})^{10} - (2 - i\sqrt{3})^{10}$ is purely imaginary

23. Solve the equation $x^4 - 14x^2 + 45 = 0$.

24. Find the value of $\cos^{-1}\left(\frac{1}{2}\right) + \sin^{-1}(-1)$

25. Find the general equation of the circle for which $(-4, -2)$ and $(1,1)$are the ends of a diameter.

26. Show that the vectors $\hat{\imath} + 2\hat{\jmath} - 3\hat{k}$, $2\hat{\imath} - \hat{\jmath} + 2\hat{k}$ and $3\hat{\imath} + \hat{\jmath} - \hat{k}$ are coplanar.

27. Solve :) $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$

28. Evaluate $\int_0^1 x^3(1 - x)^4 dx$

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29. Let $V(x,y,z) = xy + yz + zx,\ x,y,z \in \mathbb{R}$. Find the differential dV.

30. Prove that the function $f(x) = x^2 - 2x - 3$ is strictly increasing in $(2,\infty)$

PART-C

III. Answer any 7 questions.(Q.no.40 is Compulsory) **7 x 3 =21**

31. Evaluate : $\lim_{x\to 1} x^{\frac{1}{1-x}}$.

32. If $U(x,y,z) = \log(x^3 + y^3 + z^3)$, find $\frac{\partial U}{\partial x} + \frac{\partial U}{\partial y} + \frac{\partial U}{\partial z}$

33. Solve : $\frac{dy}{dx} + \frac{y}{x} = \sin x$

34. Show that the shortest distance between the lines $\vec{r} = (6\hat{\imath} + \hat{\jmath} + 2\hat{k}) + s(\hat{\imath} + 2\hat{\jmath} - 3\hat{k})$ and

$\vec{r} = (3\hat{\imath} + 2\hat{\jmath} - 2\hat{k}) + t(2\hat{\imath} + 4\hat{\jmath} - 5\hat{k})$ is $\frac{7\sqrt{5}}{5}$

35. If the normal at the point ' t_1 ' on the parabola $y^2 = 4ax$ meets the parabola again at the point ' t_2, then prove that $t_2 = -\left(t_1 + \frac{2}{t_1}\right)$.

36. Solve $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, if $6x^2 < 1$.

37. If p is real, discuss the nature of the roots of the equation $4x^2 + 4px + p + 2 = 0$, in terms of p.

38. Show that the equation $z^2 = \bar{z}$ has four solutions.

39. Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 1 & 3 \\ 2 & -1 & 3 & 4 \\ 5 & -1 & 7 & 11 \end{bmatrix}$

40. *Evaluate* : $\int_{\frac{\pi}{8}}^{\frac{3\pi}{8}} \frac{1}{1+\sqrt{\tan x}}\,dx$

PART-D

IV. Answer all the questions **7 x 5 = 35**

41. a) Investigate the values of λ and μ the system of linear equations

$x + 2y + z = 7,\ x + y + \lambda z = \mu,\ x + 3y - 5z = 5$ have

(i) no solution (ii) a unique solution (iii) an infinite number of solutions. **(OR)**

b) If $z = x + iy$ and $\arg\left(\frac{z-1}{z+1}\right) = \frac{\pi}{2}$, show that $x^2 + y^2 = 1$.

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42. a) Solve the following equation: $x^4 - 10x^3 + 26x^2 - 10x + 1 = 0$. **(OR)**

b) Find the domain of (i) $f(x) = \sin^{-1}\left(\frac{|x|-2}{3}\right) + \cos^{-1}\left(\frac{1-|x|}{4}\right)$

43. a) A bridge has a parabolic arch that is 10 m high in the centre and 30 m wide at the bottom. Find the height of the arch $6m$ from the centre, on either sides. **(OR)**

b) Prove by vector method that $\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$,

44. a) Sketch the curve $y = f(x) = x^2 - x - 6$. **(OR)**

b) If $u = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$. *show that* $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$

45. a) Find the area of the region bounded between the curves $y = \sin x$ and $y = \cos x$ and the lines $x = 0$ and $x = \pi$. **(OR)**

b) A pot of boiling water at 100°C is removed from a stove at time $t = 0$ and left to cool in the kitchen. After 5 minutes, the water temperature has decreased to 80°C, and another 5 minutes later it has dropped to 65°C. Determine the temperature of the kitchen.

46. a) Find the volume of a right circular cone of base radius 'r' and height 'h' **(OR)**

b) Find the parametric vector and Cartesian equation of the plane containing the line $\frac{x-2}{2} = \frac{y-2}{3} = \frac{z-1}{-2}$ and passing through the point (-1, 1, -1).

47. a) If the curves $ax^2 + by^2 = 1$ and $cx^2 + dy^2 = 1$ intersect each other orthogonally then, show that $\frac{1}{a} - \frac{1}{b} = \frac{1}{c} - \frac{1}{d}$. **(OR)**

b) Find the equation of the circle through the points (1,1), (2, −1), and (3,2).

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Prepared by:

E.PALAVESAM.M.Sc.,B.Ed.,