+2 MATHEMATICS – UNIT TEST 1

Time :1 hr 30 min **Section – A** **Mark : 100**

Note : ***(i) All question are compulsory.***
(ii) Each question carries one mark.
(iii) Choose the most suitable answer from the given four alternatives. ***20x 1 = 20***

1. If A = [2 0 1] then rank of AA^T is
   1) 1 2) 2 3) 3 4) 0
2. If the matrix $\begin{pmatrix} -1 & 3 & 2 \\ 1 & k & -3 \\ 1 & 4 & 5 \end{pmatrix}$ has inverse then
   1) k is any real number 2) k = -4
   3) k≠ -4 4) k ≠ 4
3. If A is a matrix of order 3, then det (kA)
   1) k^3det (A)2) k^2det (A)3) k det (A)4) det (A)
4. Every homogeneous system
   1) is always consistent 2) has only trivial solution 3) has infinitely many solutions4) need not be consistent
5. If A is a square matrix of order n, then | adj A | is
   1) $|A|^2$ 2) $|A|^n$ 3) $|A|^{n-1}$ 4) | A |

6 The inverse of $\begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix}$ is
1) $\begin{pmatrix} 2 & -1 \\ -5 & 3 \end{pmatrix}$ 2) $\begin{pmatrix} -2 & 5 \\ 1 & -3 \end{pmatrix}$ 3) $\begin{pmatrix} 3 & -1 \\ -5 & -3 \end{pmatrix}$ 4) $\begin{pmatrix} -3 & 5 \\ 1 & -2 \end{pmatrix}$

7 If the equations -2x + y + z = *l*, x - 2y + z = m, x + y - 2z = n, such that *l* + m + n = 0, then the system has
1) a non - zero unique solution2) trivial solution3) infinitely many solutions 4) no solution

8 $(A^T)^{-1}$ is equal to
1) A^{-1} 2) A^T 3) A 4) $(A^{-1})^T$

9 The rank of the matrix $\begin{bmatrix} 2 & -4 \\ -1 & 2 \end{bmatrix}$| is
1) 1 2) 2 3) 0 4) 8

10 In a system of 3 linear non - homogeneous equations with three unknowns, if Δ = 0 and Δ*x* = 0, Δy ≠ 0 and Δz = 0, then the system has
1) unique solution 2) two solutions
3) infinitely many solutions4) no solution

11 If ρ (A) = ρ (A, B) = the number of unknowns, then the system is
1) consistent and has infinitely many solutions
2) consistent and has unique solution
3) consistent 4) inconsistent

12 1If $A = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$, then (adjA) A =
a) $\begin{pmatrix} \frac{1}{5} & 0 \\ 0 & \frac{1}{5} \end{pmatrix}$ b) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ c) $\begin{pmatrix} 5 & 0 \\ 0 & -5 \end{pmatrix}$ d) $\begin{pmatrix} 5 & 0 \\ 0 & 5 \end{pmatrix}$

13 If A and B are any two matrices such that AB = 0 and A is non - singular, then
1) B = 0 2) B is singular 3) B is non - singular 4) B = A

14 If A = [2 0 1], then rank of AA^T is
1) 1 2) 2 3) 3 4) 0

15 If A is a scalar matrix with scalar k≠0, of order 3, then A^{-1} is
1)$\frac{1}{k^2}$ I2)$\frac{1}{k^3}$ I3) $\frac{1}{k}I$ 4) kI.

16 Cramer's rule is applicable only (with three unknowns) when
1) Δ≠ 0 2) Δ = 0
3) Δ = 0, $\Delta_x \neq 0$ 4) $\Delta_x = \Delta_y = \Delta_z = 0$

17 If $A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$then the rank of AA^T is
1) 3 2) 0 3) 1 4) 2

18 Equivalent matrices are obtained by
1)taking inverses 2) taking transposes
3) takingadjoints
4) taking finite number of elementary transformations

19 The system of equations ax + y + z = 0, x + by + z = 0, x + y + cz = 0 has a non - trivial solution then $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} =$
1) 1 2) 2 3) -1 4) 0

20 If the rank of the matrix $\begin{pmatrix} \lambda & -1 & 0 \\ 0 & \lambda & -1 \\ -1 & 0 & \lambda \end{pmatrix}$ is 2 then λ is
1) 1 2) 2 3) 3 4) any real number

Section – B

Note: ***(i) Answer any FIVE questions. 5 x 6 = 30***
(ii) Question No. 27 is compulsory and choose the four questions from the remaining.
(iii) Each question carries six marks.

21 If A = $\begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 0 & -1 \\ 1 & 2 \end{bmatrix}$ verify that $(AB)^{-1} = B^{-1} A^{-1}$.

22 Find the adjoint of the matrix A = $\begin{bmatrix} 4 & -3 \\ 2 & 1 \end{bmatrix}$ and verify the result A(adj A) = (adj A) A = | A |. I

23 Find the rank of the matrix $\begin{bmatrix} 1 & 2 & -1 & 3 \\ 2 & 4 & 1 & -2 \\ 3 & 6 & 3 & -7 \end{bmatrix}$

24 Solve the following non-homogeneous equations of three unknowns using determinants :2x + 2y + z = 5; x – y + z = 1 ;3x + y + 2z = 4

25.If A=$\begin{bmatrix} -2 & 3 \\ -4 & 5 \end{bmatrix}$ then verify that $(A^T)^{-1} = (A^{-1})^T$.

26. For A = $\begin{pmatrix} -1 & 2 & -2 \\ 4 & -3 & 4 \\ 4 & -4 & 5 \end{pmatrix}$, show that $A = A^{-1}$

27. (a) Solve the following system of linear equation by determinant method : 2x + 3y = 8, 4x + 6y = 16 **(OR)**
(b) Solve by matrix inversion method of system of linear equation 2x – y = 7 ; 3x – 2y = 11

Section - C

Note : ***(i) Answer any five questions. 5 x 10 =50***
(ii) Question No. 34 is compulsory and choose the four questions from the remaining.
(iii) Each question carries ten marks.

28 A small seminar hall can hold 100 chairs. Three different colours (red, blue and green) of chairs are available. The cost of a red chair is Rs. 240, cost of a blue chair is Rs. 260 and the cost of a green chair is Rs. 300. The total cost of chairs is Rs. 25,000. Find atleast 3 different solutions of the number of chairs in each colour to be purchased.

29 Show that the equations 2x + 5y + 7z = 52, x + y + z = 9, 2x + y – z = 0 are consistent and solve them by using rank method.

30 For what value of μ the equations x + y + 3z = 0, 4x + 3y + μz = 0, 2x + y + 2z = 0 have a (i) trivial solution, (ii) non-trivial solution.

31 For what values of k, the system of equations. k*x* + y + z = 1, *x* + ky + z = 1, *x* + y + kz = 1 have (i) unique solution (ii) more than one solution (iii) no solution

32 Solve the following non–homogeneous system of linear equations by determinant method :

$x + 2y + z = 2$; $2x + 4y + 2z = 4$; $x - 2y - z = 0$

33.If $A = \frac{1}{3}\begin{bmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{bmatrix}$, prove that $A^{-1} = A^T$.

34. (a) Investigate for what values of λ, μ the simultaneous equations *x* + y + z = 6, *x* + 2y + 3z = 10, *x* + 2y + λz = μ have (i) no solution (ii) a unique solution and (iii) an infinite number of solutions **(OR)**

(b) Solve by Cramer's rule : $\frac{1}{x}+\frac{2}{y}-\frac{1}{z}=1,\ \frac{2}{x}+\frac{4}{y}+\frac{1}{z}=5,\ \frac{3}{x}-\frac{2}{y}-\frac{2}{z}=0$