

**MODEL QUESTION PAPER (TERM - 1)****CLASS - +2****SUBJECT - MATHEMATICS****Time : 3 hours****M.M. : 50**

1. The function  $f : A \rightarrow B$  defined by  $f(x) = 4x + 7$ ,  $x \in \mathbb{R}$  is : 1
  - (a) One-one
  - (b) Many-one
  - (c) Odd
  - (d) Even
2. The function  $f : \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = 3 - 4x$  is 1
  - (a) Onto
  - (b) Not onto
  - (c) None one-one
  - (d) None of these
3. The binary operation  $*$  defined on set  $\mathbb{R}$ , given by  $a * b = a + b^2$  for all  $a, b \in \mathbb{R}$  is 1
  - (a) commutative
  - (b) associative
  - (c) Both (a) and (b)
  - (d) None of these
4. Let  $R$  be a relation on set of lines as  $L_1 R L_2$  if  $L_1$  is perpendicular to  $L_2$ . Then 1
  - (a)  $R$  is Reflexive
  - (b)  $R$  is transitive
  - (c)  $R$  is symmetric
  - (d)  $R$  is an equivalence relation

5. The principle value of  $\sin^{-1} a (\sqrt{3}/2)$  is 1
  - (a)  $\frac{2\pi}{3}$
  - (b)  $\frac{\pi}{6}$
  - (c)  $\frac{\pi}{4}$
  - (d)  $\frac{\pi}{3}$
6. If  $y = \sec^{-1} x$  then 1
  - (a)  $0 \leq y \leq \pi$
  - (b)  $0 \leq y \leq \frac{\pi}{2}$
  - (c)  $-\frac{\pi}{2} < y < \frac{\pi}{2}$
  - (d) None of these
7. The principle value of  $\sin^{-1} \left( \sin \frac{2\pi}{3} \right)$  is 1
  - (a)  $\frac{2\pi}{3}$
  - (b)  $\frac{\pi}{3}$
  - (c)  $-\frac{\pi}{6}$
  - (d)  $\frac{\pi}{6}$
8.  $\sin \left[ \frac{\pi}{3} - \sin^{-1} \left( \frac{-1}{2} \right) \right]$  is equal to 1
  - (a)  $\frac{1}{2}$
  - (b)  $\frac{1}{3}$
  - (c)  $\frac{1}{4}$
  - (d) 1

9. The number of all possible matrices of order  $3 \times 3$  with each entry 0 or 1 is : 1  
 (a) 27 (b) 18  
 (c) 81 (d) 512
10. If A and B are symmetric matrices of same order, then AB-BA is a 1  
 (a) Skew-symmetric matrix  
 (b) Symmetric matrix  
 (c) Zero matrix  
 (d) Identity
11. If a matrix has 6 elements, then number of possible orders of the matrix can be 1  
 (a) 2 (b) 4  
 (c) 3 (d) 6
12. The diagonal elements of a skew symmetric matrix are 1  
 (a) all zeroes  
 (b) are all equal to some scalar  $k (\neq 0)$   
 (c) can be any number  
 (d) none of these
13. Let A be a non-singular square matrix of order  $3 \times 3$ , then  $[A, \text{adj } A]$  is equal to 1  
 (a)  $|A|^3$  (b)  $|A|^2$   
 (c)  $|A|$  (d)  $3|A|$
14. The area of a triangle with vertices  $(-3, 0)$ ,  $(3, 0)$  and  $(0, k)$  is 9 sq. units. Then, the value of  $k$  will be  
 (a) 9 (b) 3  
 (c) -9 (d) 6
15. The derivative of  $\tan\left(\frac{\pi}{2} - x\right)$  is equal to 1  
 (a)  $\sec^2\left(\frac{\pi}{2} - x\right)$  (b)  $-\text{cosec}^2 x$   
 (c)  $\text{cosec}^2 x$  (d) none of these
16. If  $x = t^2$ ,  $y = t^3$ , then  $\frac{d^2 y}{dx^2} =$  1  
 (a)  $\frac{3}{2}$  (b)  $\frac{3}{4t}$   
 (c)  $\frac{3}{2t}$  (d)  $\frac{3t}{2}$
17. Derivative of  $\sin x$  w.r.t.  $\cos x$  is 1  
 (a)  $-\cot x$  (b)  $\cot x$   
 (c)  $\tan x$  (d) none of these
18. If  $y = \log \sqrt{\tan x}$ , then  $\frac{dy}{dx}$  is 1  
 (a)  $\cos 2x$  (b)  $\sin 2x$   
 (c)  $\text{cosec } 2x$  (d) none of these
19. The function  $(x) = 4 - 3x + 3x^2 - x^3$  is :  
 (a) decreasing on R (b) increasing on R  
 (c) strictly decreasing on R  
 (d) strictly increasing on R

20. The line  $y = x + 1$  is a tangent to the curve  $y^2 = 4x$  at the point

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

21. Check the injectivity and surjectivity of the function :

(i)  $f: \mathbb{N} \rightarrow \mathbb{N}$  given by  $f(x) = x^2$

Or

Show that  $f: [-1, 1] \rightarrow \mathbb{R}$ , given by  $f(x) = (2)xx + 1$  is one-one. Find the inverse of the function  $f: [-1, 1] \rightarrow$   
Range  $f$

22. Express in surplest form  $\tan^{-1}\left(\frac{\cos x}{1 - \sin x}\right)$  3

$$\frac{-\pi}{2} < x < \frac{\pi}{2}$$

23. Express the matrix **as** sum of symmetric and skew symmetric matrix. 3

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

Or

$$\text{Find } A^2 - 5A + 6I \text{ if } A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$$

24. Show that

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c) \quad 3$$

25. Find the value of  $k$  so that the function  $f$ , defined by 3

$$f(x) = \begin{cases} kx+1 & \text{if } x \leq 5 \\ 3x-5 & \text{if } x > 5 \end{cases} \text{ is continuous at } x = 5$$

26. If  $y = 3e^{2x} + 2e^{3x}$  then prove that

$$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0 \quad 3$$

Or

$$\text{Find } \frac{dy}{dx} \text{ if } \sin^2 y + \cos xy = \overline{x}$$

27. Solve the following system of equations by matrix method. 6

$$x - y + z = 4$$

$$2x + y - 3z = 0$$

$$x + y + z = 2$$

28. (a) Find the equations of tangent and normal to

$$\text{hyperbola } \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \text{ at point } (x_0, y_0)$$

- (b) Find approximate value of  $\sqrt{25.3}$  6

Or

- (a) Find two positive numbers  $x$  and  $y$  such that their sum is 35 and the product  $x^2y^5$  is maximum.
- (b) Find the interval in which the function of given by  $f(x) = -2x^3 - 9x^2 - 12x + 1$  is strictly increasing and strictly decreasing.