Std : XI ***Model Half Yearly Exam2017*** ***Marks : 90***
Sub : Maths ***Time : 2 ½ hrs.***

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SECTION-A

I. Choose the correct answer: **1x20=20**

1. If [3 -1 2] B= [5 6] the order of matrix B is
   (1) 3x1 (2) 1x3 (3) 3x2 (4) 1x1

2. If A is a square matrix of order n then $|kA|$ is
   (1) $k|A|$ (2) $-k|A|$ (3) $k^n|A|$ (4) $-k^n|A|$

3. The cofactor of 1 is $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ is
   (1) -12 (2) 12 (3) -7 (4) 7

4. Let $\vec{a},\vec{b}$ be the vectors $\overrightarrow{AB},\overrightarrow{BC}$ determined by two adjacent sides of regular hexagon ABCDEF. The Vector represented by $\overrightarrow{EF}$ is
   (1) $\vec{a},-\vec{b}$ (2) $\vec{a}+\vec{b}$ (3) $2\vec{a}$ (4) $-\vec{b}$

5. If $\vec{a}=2\vec{i}+\vec{j}-8\vec{k}$ and $\vec{b}=\vec{i}+3\vec{j}-4\vec{k}$ then the magnitude of $\vec{a}+\vec{b}=$
   (1) 13 (2) 13/3 (3) 3/13 (4) 4/13

6. If G is the centroid of a triangle ABC and G' is the centroid of triangle A' B' C'then $\overrightarrow{AA'}+\overrightarrow{BB'}+\overrightarrow{CC'}=$
   (1) $\overrightarrow{GG'}$ (2) $3\overrightarrow{GG'}$ (3) $2\overrightarrow{GG'}$ (4) $4\overrightarrow{GG'}$

7. 20 persons are invited for a party. The number of ways in which they and the host can be seated at a circular table if two particular persons be seated on either side of the host is equal to
   (1) 18! 2! (2) 18! 3! (3) 19! 2! (4) 20!

8. The sum to the first 20 terms of the series 1+2+3+……is
   (1)210 (2)120 (3)325 (4)400

9. Which of the following has the greatest y – intercept in magnitude?
   (1) 2x + 3y =4 (2) x +2y =3 (3) 3x + 4y =5 (4) 4x +5y = 6

10. If $2x^2 + kxy + 4y^2 = 0$ represents a pair of parallel lines then k =
    (1) ± 32 (2) $\pm 2\sqrt{2}$ (3) $\pm 4\sqrt{2}$ (4) ± 8

11. If two circles touch each other externally then the distance between their centres is
    (1) $r_1 - r_2$ (2) $\frac{r_1}{r_2}$ (3) $\frac{r_2}{r_1}$ (4) $r_1 + r_2$

12. $\frac{1}{360}$ of a complete rotation clock wise is
    (1) -1° (2) -360° (3) -90° (4) 1°

13. In triangle ABC, the value of sin A sin B sin C is
    (1) $\frac{\Delta}{2R}$ (2) $\frac{\Delta}{4R}$ (3) $\frac{\Delta}{2R^2}$ (4) $\frac{\Delta}{4R^2}$

14.The inverse of $f:R\to R^+; f(x)=x^2$ is

(1) not onto (2) not one to one
(3) not onto and not one to one (4) not at all a function

15.Identify the correct statements

(i) The domain of circular functions are always R
(ii) The range of tangent function is R
(iii) The range of cosine function is same as the range of sine function
(iv)The domain of cotangent function is R – {k π}

(1) All (2) (i) and (iii) (3) (ii), (iii) and (iv) (4) (iii) and (iv)

16. $\lim_{x\to 0}\frac{sin\beta x}{sin\alpha x}$ (1) $\frac{\alpha}{\beta}$ (2) $\frac{\beta}{\alpha}$ (3)$-\frac{\alpha}{\beta}$ (4) 0

17.The function $f(x)=\begin{cases}2, x\le 1\\ x, x>1\end{cases}$ is not differentiable at

(1)x = 0 (2) x = -1 (3) x =1 (4) x = - 2

18.Identify the correct statement

(1) The set of real numbers is a closed set
(2) The set of all non –negative real numbers is represented by $(0,\infty)$
(3) The set of [3, 7] indicates the set of all natural numbers between 3 and 7
(4) (2, 3) is a subset of [2, 3]

19.The derivative of $\sqrt{x}$

(1) $\frac{1}{2\sqrt{x}}$ (2) $\frac{1}{\sqrt{x}}$ (3) $\frac{1}{-\sqrt{x}}$ (4)- $\frac{1}{2\sqrt{x}}$

20.$\int \frac{sinx}{cos^2 x}\,dx$

(1)-cotx (2)-cosecx+c (3)secx+c (4)cosx+c

PART-B

II. Answer any 7 of the following questions:
Question no: 30 is compulsory: **7 x 2 =14**

21.If $\begin{bmatrix}2x & 3x-y\\ 2x+z & 3y-w\end{bmatrix}=\begin{bmatrix}3 & 2\\ 4 & 7\end{bmatrix}$ find x, y,z, w

22.Solve for x if $\begin{vmatrix}x & 5\\ 7 & x\end{vmatrix}+\begin{vmatrix}1 & -2\\ -1 & 1\end{vmatrix}=0$

23.If $\overrightarrow{PO}+\overrightarrow{OQ}=\overrightarrow{QO}+\overrightarrow{OR}$, Show that the points P, Q, R are collinear.

24.If $\vec{a}=3\vec{i}-\vec{j}-4\vec{k}, \vec{b}=-2\vec{i}+4\vec{j}-3\vec{k}$ and $\vec{c}=\vec{i}+2\vec{j}-\vec{k}$ find $|2\vec{a}-\vec{b}+3\vec{c}|$

25.If ${}_9P_r = 3024$, find r.

26.A straight line makes an angle of 45° with x –axis and passes through the point (3,-3). Find its Equation.

27.Solve: $\frac{x+1}{x-1}>0, x\neq 1$

28.Prove that $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A.\ \operatorname{cosec}^2 A$.

29.Differentiate :$e^{\sin x^2}$

30.Integrate: $\frac{1}{1+cosx}$

PART-C

III. Answer any 7 questions of the following

Question no: 40 is compulsory. **7 x 3=21**

31.If $A=\begin{bmatrix}2 & 3\\ 4 & 5\end{bmatrix}$ find A^2-7A-2I.

32.Prove that $\begin{vmatrix}a_1 & b_1\\ a_2 & b_2\end{vmatrix}^2 = \begin{vmatrix}a_1^2+a_2^2 & a_1b_1+a_2b_2\\ a_1b_1+a_2b_2 & b_1^2+b_2^2\end{vmatrix}$

33.Show that the points with position vectors $\vec{a}-2\vec{b}+3\vec{c}, -2\vec{a}+3\vec{b}+2\vec{c}$ and $-8\vec{a}+13\vec{b}$ are collinear.

34.Resolve into partial fractions: $\frac{7x-1}{6-5x+x^2}$

35.In how many ways a committee of 5 members can be selected from 6 men and 5 women,consisting of men and 2 women?

36.If the two straight lines 2x-3y + 9 =0, 6x + ky + 4 =0 are parallel, find *k*.

37.The area of a circle is 16π square units. If the centre of the circle is (7,-3), find the equation of the circle.

38.If tan A = $\frac{5}{6}$, tan B = $\frac{1}{11}$ show that A + B = 45°

39.If y =500 e^{7x}+600e^{-7x}, show that $\frac{d^2y}{dx^2}=49y$

40.Let f: R→ *R* be defined by f(x)=3x+2,Find f^{-1} and show that$f.f^{-1}=f^{-1}.f=I$

PART- D

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

41.Prove that $\begin{vmatrix}a-b-c & 2a & 2a\\ 2b & b-c-a & 2b\\ 2c & 2c & c-a-b\end{vmatrix}=(a+b+c)^3$

(OR)

State prove section formula by using internal division.

42.Resolve into partial fractions : $\frac{x+2}{(x+1)(x^2+1)}$

(OR)

Find the co-ordinates of orthocentre of the triangle formed by the straight lines *x- y- 5 =0, 2x-y-8 =0 and 3x-y-9 =0*

43.Find the equation of the circle passing through the points (1,0), (0,-1) and (0,1)

(OR)

If tanθ+secθ =x, show that $2\tan\theta = x - \frac{1}{x}$, $2\sec\theta = x + \frac{1}{x}$ *, Hence show that sin* $\theta = \frac{x^2-1}{x^2+1}$.

44.If a,b,c are in H.P prove that $\frac{b+a}{b-a} + \frac{b+a}{b-c} = 2$

(OR)

Prove by Mathematical induction that $a^n - b^n$ is divisible by (a-b) for all n$\in N$

45.If $x \in R$, Prove that the range of the function *f(x)* = $\frac{x^2-3x+4}{x^2+3x+4}$ is $\left[\frac{1}{7}, 7\right]$

(OR)

Differentiate: $tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$

46.If x= sin t ; y = sin *pt* show that (1-x^2) $\frac{d^2y}{dx^2} - x\frac{dy}{dx} + p^2y = 0$

(OR)

Find $\frac{dy}{dx}$ for the implicit functions: $x^m y^n = (x + y)^{m+n}$

47.Prove that : $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$

(OR)

Prove that Cos(A-B)=cosAcosB+sinASinB

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