

**JB Academy**  
**Annual Examination : 2019 – 20**  
**Class XI (Mathematics - 041)**

**TIME: 3 Hrs**

**M.M : 80**

**General Instructions :**

- (i) **All questions are compulsory.**
  - (ii) **The question paper contains 36 questions. Question numbers 1 to 20 carry one mark each, question numbers 21 to 26 carry 2 marks each, question numbers 27 to 32 carry 4 marks each and question numbers 33 to 36 carry 6 marks each.**
  - (iii) **Question numbers 1 to 20 are to be answered in one word, one sentence or as per the exact requirement of the question.**
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**SECTION – A (each of one mark)**

- Q1 Value of  $\operatorname{cosec}(-1410^\circ)$  is  
(a)  $-2$  (b)  $\frac{1}{2}$  (c)  $2$  (d)  $-\frac{1}{2}$
- Q2 In any triangle ABC, if  $a = 18$ ,  $b = 24$ ,  $c = 30$ , then value of  $\cos B$  is  
(i)  $\frac{3}{5}$  (ii)  $\frac{2}{5}$  (iii)  $\frac{1}{5}$  (iv)  $\frac{4}{5}$
- Q3 Modulus of complex no.  $z = -1 - \sqrt{3}i$  is (a)  $-2$  (b)  $2$  (c)  $-\sqrt{2}$  (d)  $\sqrt{2}$
- Q4 Square root of  $-15 - 8i$  is (a)  $1 - 4i$  (b)  $-1 + 4i$  (c)  $1 - 4i$  or  $1 + 4i$  (d) None of these.
- Q5 If  $8^{\text{th}}$  term of a G.P is 192 and the common ratio is 2, then its  $12^{\text{th}}$  term will be  
(a) 192 (b) 64 (c) 16 (d) 3072
- Q6 The angle between the X-axis and the line segment joining the points  $(3, -1)$  and  $(4, -2)$  is  
(i)  $45^\circ$  (ii)  $135^\circ$  (iii)  $30^\circ$  (iv)  $60^\circ$
- Q7 Equation of the circle with centre  $(-2, 3)$  and radius 4 is .....
- Q8 Mean deviation about the mean for the data 38, 70, 48, 40, 42, 55, 63, 46, 54 and 44 is  
(i) 4 (ii) 7 (iii) 3 (iv) 5
- Q9 The line through the points  $(h, 3)$  and  $(4, 1)$  intersects the line  $7x - 9y - 19 = 0$  at right angle, then the value of  $h$  will be  
(i)  $\frac{22}{9}$  (ii)  $\frac{11}{9}$  (iii)  $\frac{33}{9}$  (iv)  $\frac{44}{9}$
- Q10 The point  $(-3, -1, 6)$  lies in octant (i) I (ii) IV (iii) III (iv) VII
- Q11 Find the general solution of the equation  $\cot x = -\sqrt{3}$
- Q12 How many 4 – digit numbers are there with no digit repeated ?
- Q13 Using Binomial theorem which number is larger either  $(1.1)^{10000}$  or 1000 ?
- Q14 Find the  $4^{\text{th}}$  term in the expansion of  $(x - 2y)^{12}$

- Q15 If the sum of three numbers in A.P is 24 and their product is 440, find the numbers.
- Q16 How many terms of G.P  $3, 3^2, 3^3, \dots$  are needed to give the sum 120 ?
- Q17 Find the equation of a line whose perpendicular distance from the origin is 5 units and the angle made by the perpendicular with positive X – axis is  $30^\circ$ .
- Q18 Find the co- ordinates of the focus, axis of the parabola, the equation of the directrix and length of the latus rectum of  $x^2 = - 9y$
- Q19 Evaluate :  $\lim_{x \rightarrow 0} \frac{\cos x}{\pi - x}$
- Q20 Find the derivative of the function  $f(x) = \frac{1}{x^2}$

**SECTION – B (Each of 2 marks)**

- Q21 Evaluate :  $(\sqrt{2} + 1)^6 + (\sqrt{2} - 1)^6$  by using Binomial theorem.

**OR**

The coefficients of the  $(r - 1)^{\text{th}}$ ,  $r^{\text{th}}$  and  $(r + 1)^{\text{th}}$  terms in the expansion of  $(x + 1)^n$  are in the ratio of 1 : 3 : 5. Find both n and r.

- Q22 If a, b, c, d are in G.P. Prove that :  $(a^n + b^n)$ ,  $(b^n + c^n)$ ,  $(c^n + d^n)$  are in G.P.

**OR**

Find the 20<sup>th</sup> term of the series :  $(2 \times 4) + (4 \times 6) + (6 \times 8) + \dots$  to n terms.

- Q23 Solve the equation  $9x^2 - 12x + 20 = 0$  by factorization method.
- Q24 If P(a, b) is the mid point of a line segment between the axes. Show that the equation of the line is  $\frac{x}{a} + \frac{y}{b} = 2$
- Q25 Find the area of the triangle formed by the lines joining the vertex of the parabola  $x^2 = 12y$  to the ends of its latus rectum.
- Q26 Find the equation of set of points P, the sum of whose distance from A (4, 0, 0) & B(- 4,0 ,0) is equal to 10.

**SECTION – C (Each of 4 marks)**

- Q27 Find the domain and range of real function f defined by (i)  $f(x) = \sqrt{x - 3}$  (ii)  $f(x) = |x - 2|$
- Q28 In how many ways can the letters of the word PERMUTATIONS be arranged if the
- (i) Words start with P and end with S ?
  - (ii) Vowels are together
  - (iii) There are always 4 letters between P and S ?

- Q29 If three lines whose equations are  $y = m_1x + c_1$  ;  $y = m_2x + c_2$  and  $y = m_3x + c_3$  are concurrent, then show that :  $m_1(c_2 - c_3) + m_2(c_3 - c_1) + m_3(c_1 - c_2) = 0$

**OR**

A ray of light passes through the point (1, 2) reflects on the X- axis at a point A and the reflected ray passes through the point (5, 3). Find the co – ordinates of A.

- Q30 Find the equation of the circle passing through (0, 0) making intercepts a and b on the co-ordinate axes.
- Q31 Find the derivative of the function  $\frac{x+1}{x-1}$  using first principle.

**OR**

Find the derivative of  $f(x) = \frac{x}{(\sin x)^n}$

- Q32 If E & F are the events such that  $P(E) = 1/4$  ,  $P(F) = 1/2$  and  $P(E \& F) = 1/8$  , then find :
- (a)  $P(E \text{ or } F)$  (B)  $P(\text{ not } E \text{ and not } F)$

**SECTION – D (Each of 6 marks)**

- Q33 (a) For any  $\Delta ABC$  , prove that :  $a \cos A + b \cos B + c \cos C = 2a \sin B \cdot \sin C$
- (b) Prove that :  $\cos 4x = 1 - 8 \sin^2 x \cdot \cos^2 x$
- Q34 Solve the inequations graphically :  $3x + 2y \leq 12$  ,  $x \geq 1$  ,  $y \geq 2$

**OR**

$X + 3y \leq 12$  ,  $x \geq 0$  ,  $y \geq 0$  ,  $3x + y \leq 12$

- Q35 The sum of the first three terms Of a G.P is 16 and the sum of the next three terms is 128. Determine the first term, common ratio and the sum to n terms of the G.P

**OR**

The sum of first four terms of an A.P is 56. The sum of last four terms is 112. If its first term is 11, then find the number of terms.

- Q36 Find the mean and standard deviation for the following distribution :

Marks	20 - 30	30 -40	40 - 50	50 - 60	60 -70	70 - 80	80 - 90
No. of students	3	6	13	15	14	5	4