

MT

2017 ____ ____ 1100

Seat No.

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MT - MATHEMATICS (71) ALGEBRA - SEMI PRELIM - II - PAPER - 2 (E)

Time : 2 Hours

(Pages 3)

Max. Marks : 40

Q.1. Solve the following : (Any 5)

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- (i) Find the first five terms of the following sequence, whose 'nth' term is given : $t_n = n^2 - 2n$.
- (ii) State whether the following equation is quadratic or not ?
$$\frac{5}{x} - 3 = x^2$$
- (iii) If the value of the determinant $\begin{vmatrix} m & 2 \\ -5 & 7 \end{vmatrix}$ is 31, find m.
- (iv) Is the following list of numbers an Arithmetic Progression ? Justify.
1, 3, 6, 10,
- (v) Determine whether the given value of 'x' is a root of given quadratic equation : $x^2 + 2x + 1 = 0$, $x = -1$.
- (vi) If $D_y = -15$ and $D = -5$ are the values of the determinants for certain simultaneous equations in x and y, find y.

Q.2. Solve the following : (Any 4)

8

- (i) Find the twenty fifth term of the A. P. : 12, 16, 20, 24,
- (ii) Solve the following equation by factorization method :
 $y^2 + 8y + 16 = 0$
- (iii) If the point (3, 2) lies on the graph of the equation $5x + ay = 19$, then find a.

- (iv) Solve the following simultaneous equations using Cramer's rule :
 $4x + 3y - 4 = 0$; $6x = 8 - 5y$
- (v) If one root of the quadratic equation $x^2 - 7x + k = 0$ is 4, then find the value of k.
- (vi) Two coins are tossed. Find the probability of the event.
Head does not appear.

Q.3. Solve the following : (Any 3)**9**

- (i) The sum of first n terms of an A.P. is $3n + n^2$ then (i) find first term and sum of first two terms. (ii) find second, third and 15th term.
- (ii) Solve the following quadratic equation by completing square :
 $z^2 + 6z - 8 = 0$.
- (iii) Sum of two numbers is 97. If the larger number is divided by the smaller, the quotient is 7 and the remainder is 1. Find the numbers.
- (iv) In the following experiment, write the sample space S, number of sample point n (S), event A, B, C and n (A), n (B), n (C). Also find complementary events, mutually exclusive events :
A die is thrown. A is the event that prime number comes up, B is the event that the number is divisible by three comes up, C is the event that a perfect square number comes up.
- (v) Solve the following quadratic equation by using formula :
 $m^2 - 3m - 10 = 0$

Q.4. Solve the following : (Any 2)**8**

- (i) Find the sum of the first n even natural numbers. Hence find the sum of first 20 even natural numbers.
- (ii) Solve the following simultaneous equations using graphical method :
 $3x + 4y + 5 = 0$; $y = x + 4$
- (iii) There are three boys and two girls. A committee of two is to be formed. Find the probability of events that the committee contains :
(a) at least one girl (b) one boy and one girl (c) only boys

Q.5. Solve the following : (Any 2)**10**

- (i) Solve the following simultaneous equations :

$$\frac{2}{x} + \frac{6}{y} = 13, \quad \frac{3}{x} + \frac{4}{y} = 12$$

- (ii) Babubhai borrows Rs. 4000 and agrees to repay with a total interest of Rs. 500. in 10 instalments, each instalment being less than the preceding instalment by Rs. 10. What should be the first and the last instalment?
- (iii) A bus covers a certain distance with uniform speed. If the speed of the bus would have been increased by 15 km/h, it would have taken two hours less to cover the same distance and if the speed of the bus would have been decreased by 5 km/h, it would have taken one hour more to cover the same distance. Find the distance covered by the bus.