

# Model Paper Class 11<sup>th</sup>, 2018

Time: 3 Hours

Max. Marks: 100

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## General Instructions:

- a) All questions are compulsory
  - b) The questions paper contains 29 questions
  - c) Question 1-4 in section A are very short answer type questions carrying 1 marks each
  - d) Questions 5-12 in section B are short answer type questions carrying 2 marks each
  - e) Questions 13-23 in section C are long answer type questions carrying 4 marks each
  - f) Questions 24-29 in section D are long answer type questions carrying 6 marks each.
  - g) There is no overall choice. However an internal choice is given in three questions of section C and three questions of section D. Do only one out of them.
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## Section (A)

### Questions from 1-4 are of 1 mark each

Q. No. 1. Do as directed;

(I) If Set A has 'm' elements and set B has 'n' elements, then the number of relations from set A to set B are; (Choose correct One)

- (a)  $2^m$
- (b)  $mn$
- (c)  $m + n$
- (d)  $2^{mn}$

(II) Which one of the following functions is invertible?

(Choose correct one)

- (a) One-One Into functions
- (b) Many One onto functions
- (b) Many-one into functions
- (d) One-One onto functions

(III) The value of  $\lim_{x \rightarrow 0} \frac{\sin x}{x}$  (Where 'x' is in radians) is = .....

(Fill in the blanks)

(IV) The value of;  $\lim_{n \rightarrow \infty} \frac{x^n - a^n}{x - a} = na^{n-1}$

(True/False)

## Section (B)

### Question from 5 to 12 are of 2 marks each

Q.No.5. Write down the all subsets of  $A = \{a, b\}$

Q.No.6. Find the degree measure of  $\frac{5\pi}{3}$  radians

Q.No.7. Find the value of;  $i^2 + (-i)^4 - i^6$

Q.No.8. Evaluate the limit;  $\lim_{n \rightarrow 0} \frac{\sin ax + bx}{ax + \sin bx}$ ,  $a, b, a+b \neq 0$

Q.No.9. Find  $\frac{dy}{dx}$  when  $y = 4x^3 + \cos x - \tan x$

Q.No.10. If  $P(A) = \frac{1}{4}$  then what is  $p(\text{not } A)$ ?

Q.No.11. Find the coefficient of  $x^3$  in the expansion of  $(1 + \frac{4}{3}x)^7$

Q.No.12. Find first five terms of sequence  $a_n = n(\frac{n^2+5}{4})$

## Section (C)

### Question from 13 to 23 are of 4 marks each

Q.No.13. If  $U = \{1,2,3,4,5,6,7,8,9\}$ ,  $A = \{2,4,6,8\}$  and  $B = \{2,3,5,7\}$ . Verify that;

$$(I) (A \cup B)' = A' \cap B'$$

$$(II) (A \cap B)' = A' \cup B'$$

Q.No.14. Determine the domain and range of the relation  $R$  defined by:

$$R = \{(x, x + 5) : x \in \{1,2,3,4,5\}\}$$

Q.No.15. Prove that:  $1^3 + 2^3 + 3^3 + \dots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$  by using principle of Mathematical induction.

Q.No.16. Prove that:  $\frac{\sin 5x + \sin 3x}{\cos 5x - \cos 3x} = \tan 4x$

Q.No.17. Convert the given complex number into the polar form;

$$Z = \sqrt{3} + i$$

Q.No.18. Find the derivative of;  $\frac{\sin x + \cos x}{\sin x - \cos x}$

Or

Evaluate the limit;  $\lim_{x \rightarrow 0} \frac{\tan 3x - 2x}{3x - \sin^2 x}$

Q.No.19. Find the equation of circle passing through the points (2,3) and whose centre is (0, -2)

Q.No.20. 15. If E and F are the events such that  $P(E) = \frac{1}{4}$ ;  $P(F) = \frac{1}{2}$  and  $p(E \text{ and } F) = \frac{1}{8}$ . Find;

(I)  $P(E \text{ or } F)$

(II)  $P(\text{Not } E \text{ and Not } F)$

Or

If A and B are the events such that  $P(A) = 0.42$ ,  $P(B) = 0.48$  and  $P(A \text{ and } B) = 0.16$ . Determine;

(I)  $P(\text{not } A)$

(II)  $P(A \text{ or } B)$

Q.No.21. Find the middle term in the expansion of;  $(3 - \frac{x^3}{6})^7$

Or

Show that  $9^{n+1} + 8n - 9$  is divisible by 64, whenever 'n' is positive integer.

Q.No.22. Find the ratio in which  $YZ - plane$  divides the line segment formed by the joining the points (-2, 4, 7) and ( 3, -5, 8)

Q.No.23. (I) Write the negation of the statement; Srinagar is a city

(II) Write the converse of the statement; If 'n' is even, then 'n<sup>2</sup>' is even

### Section (D)

#### Question from 24 to 29 are of 6 marks each

Q.No.24. Prove that;  $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3}\right) + \cos^2 \left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

Or

Find the general solution and the principle solution of:

$$\cos 3x + \cos x - \cos 2x = 0$$

Q.No.25. Q.No.4. Find 'n' if;

$$(I) (n - 1)P_3 : nP_4 = 1 : 9$$

$$(II) 2n_{c_3} : n_{c_3} = 12 : 1$$

Or

In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together.

Q.No.26. If p and q are the lengths of perpendiculars from the origin to the line

$x \cos \phi - y \sin \phi = k \cos 2\phi$  and  $x \sec \phi + y \operatorname{cosec} \phi = k$  respectively.  
Prove that  $p^2 + 4q^2 = k^2$

Q.No.27. Find the coordinates of the foci, the vertices, the length of major and minor axes, the eccentricity and the length of the Latus Rectum of the ellipse  $\frac{x^2}{36} + \frac{y^2}{16} = 1$

Q.No.28. Calculate the mean, variance and the standard deviation for the following distribution;

|            |       |       |       |       |       |       |        |
|------------|-------|-------|-------|-------|-------|-------|--------|
| Class:     | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
| Frequency: | 3     | 7     | 12    | 15    | 8     | 3     | 2      |

Q.No.29. Sum of first p, q and r terms of an A.P are a, b and c respectively. Prove that;  $\frac{a}{q}(q - r) + \frac{b}{r}(r - p) + \frac{c}{p}(p - q) = 0$

Or

Find the sum of the sequence 7, 77, 777, ... to n terms.