

Model Paper Class 11th, 2018

Applied Math

Time: 3 Hours

Max. Marks: 100

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.

Section (A)

Questions from 1-4 are of 1 mark each

Q.No.1. If a set A has n elements. Then the number of subsets is

- (a) n^2
- (b) 2^n
- (c) $n + 2$
- (d) $2n$

Q.No.2. Polynomial equation of degree n has n roots. (True/False)

Q.No.3. The n^{th} term of the sequence $1 \times 2 \times 3 + 2 \times 3 \times 4 + 3 \times 4 \times 5 + \dots$ is

Q.No.4. For any real numbers ' x ' and ' y ', $\sin x = \sin y$, implies

- (a) $x = y$
- (b) $x = n\pi + (-1)^n y$
- (c) $n\pi + (-1)^n y$
- (d) $x = \frac{\pi}{2} + y$

Section (B)

Questions from 5-12 are of 2 mark each

- Q.No.5. If $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$. Find 'x' and 'y'
- Q.No.6. Find the multiplicative inverse of $Z = \sqrt{5} + 3i$
- Q.No.7. Find first four terms of sequence $a_n = (-1)^{n-1} 5^{n+1}$
- Q.No.8. Find the value of $\sin\left\{\frac{-11\pi}{3}\right\}$
- Q.No.9. Find the multiplicative inverse of $Z = \sqrt{5} + 3i$
- Q.No.10. Find the slope of the line passing through origin and (2,3)
- Q.No.11. Find the sample space when a coin is tossed twice.
- Q.No.12. Check if the vectors $\vec{a} = 3\hat{i} + 2\hat{j}$ and $\vec{b} = 2\hat{i} - 3\hat{j}$ are orthogonal.

Section (C)

Questions from 13-23 are of 4 mark each

- Q.No.13. If $f = \left\{\left(x, \frac{x^2}{1+x^2}\right) : x \in R\right\}$ be a function from R to R . Determine the range of f
- Q.No.14. Express the following in the form of $a + ib$
- $$\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+2i)-(\sqrt{3}-2i)}$$
- Or
- Solve for x ; $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$
- Q.No.15. Find the sum of 'n' terms of an A.P whose k^{th} term is $5k + 1$
- Q.No.16. Prove that $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\tan x + \tan y}{\tan x - \tan y}$
- Q.No.17. Find the value of other five trigonometric ratios, given $\cos x = \frac{-1}{2}$; x lies in III quadrant.

Or

Prove the following;

$$\frac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = \frac{-\sin 2x}{\cos 10x}$$

Q.No.18. Find the value of 'r' if $5P_r = 6P_{r-1}$

Or

How many chords can be drawn through 21 points on a circle.

Q.No.19. Find the value of $\sin\left\{\frac{-11\pi}{3}\right\}$

Q.No.20. Find the slope of the line passing through origin and (2,3)

Q.No.21. A letter is chosen at random from the word "ASSASSINATION". Find the probability that letter is:

(I) a vowel

(II) a consonant

Q.No.22. Find:

(I) Dot product of; $\vec{a} = 3\hat{i} + 2\hat{j} - 6\hat{k}$ and $\vec{b} = 2\hat{i} + 4\hat{j} + 6\hat{k}$

(II) Cross product of; $\vec{a} = 2\hat{i} + \hat{k}$ and $\vec{b} = \hat{i} - \hat{j}$

Q.No.23. If $ABCDE$ is a pentagon. Prove that $\vec{AB} + \vec{BC} + \vec{CD} + \vec{DE} + \vec{EA} = \vec{0}$

Section (D)

Questions from 24-29 are of 6 mark each

Q.No.24. Let $U = \{1,2,3,4,5,6,7,8,9\}$

$$A = \{2,3,5,7\}$$

$$B = \{1,4,6,8\}$$

Find: (I) $A' \cap B'$

(II) Verify; $(A \cup B)' = A' \cap B'$ and $(A \cap B)' = A' \cup B'$

Or

Find the domain and the range of the function:

$$f(x) = \sqrt{9 - x^2} \quad \forall x \in R$$

Q.No.25. If α and β are different complex number with $|\beta|=1$ Find; $\left| \frac{1-\alpha}{1-2\beta} \right|$

Or

Convert the complex number $Z = \frac{i-1}{\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}}$ in the polar form

Q.No.26. Sum of first p , q and r terms of an A.P are a , b and c respectively. Prove that; $\frac{a}{q}(q-r) + \frac{b}{q}(r-p) + \frac{c}{r}(p-q) = 0$

Or

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

Q.No.27. In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together.

Q.No.28. If p and q are the lengths of perpendiculars from the origin to the line $x \cos \theta - y \sin \theta = k \cos 2\theta$ and $x \sec \theta + y \operatorname{cosec} \theta = k$ respectively. Prove that $p^2 + 4q^2 = k^2$

Q.No.29. 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) $P(\text{Not } E \text{ and Not } F)$