

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION
ALTO BETIM – GOA 403521

Std : XI COMMERCE
2016]

Sub: MATHEMATICS

[effective from June

MODEL QUESTION PAPER - First Term Examination

Time : 2½ hrs.

Max Marks : 80

GENERAL INSTRUCTIONS:

- This question paper contains seven main questions.
- All seven questions are compulsory.
- Use of calculator is not allowed.
- Log tables will be supplied on request.
- Graphs should be drawn on the answer paper only.
- For each main questions the sub questions carry the following marks:
A = 1 mark, B = 2 marks, C = 3 marks, D = 4 marks, E = 5 marks.

1.A. If $A = \{1, 2\}$, then find $A \times A$.

B. Solve the quadratic equation $2x^2 - 4x + 3 = 0$

C. Prove that $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$

D. By using Mathematical Induction prove that

$$1 + 3 + 3^2 + \dots + 3^{n-1} = \frac{3^n - 1}{2}, \text{ for all } n \in N$$

2.A. Compute $\frac{12!}{10! 2!}$

B. How many words with or without meaning can be formed using all the letters of the word EQUATION using each letter exactly once.

C. In a survey it was found that 21 people like product A, 26 liked B and 29 liked C. If 14 people liked product A and B, 12 liked C and A, 14 liked product B and C and 8 liked all three products. Find how many liked product C only.

D. Find the domain of the function $f(x) = \sqrt{(x-1)(3-x)}$

3.A. Convert 750 degrees into radians.

B. A Horse is tied to the pole by a rope 30m long. If the horse moves along the circumference of the circle keeping the rope tight, find how far it would move when the rope has traced an angle of 105 degrees.

C. Express $\frac{3+2i}{2-5i} + \frac{3-2i}{4+3i}$ in the form $a + bi$.

D. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has

i. atleast one boy

ii. atleast 3 girls

4.A. Define conjugate of a complex number.

B. If $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ with subsets $A = \{1, 3, 5, 7\}$ and $B = \{2, 5, 7, 9\}$
 Verify that $(A \cap B)' = A' \cup B'$

C. Solve $\frac{x}{4} < \frac{5x-2}{3} - \frac{7x-3}{5}$

D. Prove that

$$\cos 8^\circ \cos 10^\circ \cos 12^\circ - \sin 8^\circ \sin 10^\circ \cos 12^\circ - \sin 18^\circ \sin 12^\circ = \frac{\sqrt{3}}{2}$$

5.A. Select and write the correct alternative from those given below.

If ${}^n C_8 = {}^n C_9$, then $n =$ -----

- i. 7 ii. 8 iii. 17 iv. 9

B. Convert $\frac{5\pi}{4}$ into degrees and 315° into radians.

C. Find mean deviation about the median for the following data.

X	3	6	9	12	13	15	21	22
F	3	4	5	2	4	5	4	3

D. Solve the following system of inequalities graphically
 $2x + y \geq 4$; $x + y \leq 3$; $2x - 3y \leq 6$; $x \geq 0$; $y \geq 0$

6.A. Select and write the correct alternative from those given below.
 20th term of the sequence 7, 12, 17, is

- i) 20 ii) 32 iii) 56 iv) 102

B. Define i) Arithmetic progression ii) Geometric mean.

C. How many terms are required to give the sum - 25 of the A.P
 -6, -11/2, -5,

D. Find square root of complex number $z = 5 + 12i$

E. Attempt ANY ONE of the following.

(i) Find the sum of the sequence 6, 66, 666, upto n terms.

(ii) Find the sum of the series $1.2.3 + 2.3.4 + 3.4.5 + \dots$ upto n terms

7.A. Select and write the correct alternative from those given below.

Standard deviation is one of the.....

- i) central tendency ii) measure of dispersion iii) mode iv) median.

B. Insert 6 numbers between 3 and 24 such that the resulting sequence is A. P.

C. Find standard deviation for the following data.

C.I	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	9	17	32	33	40	10	9

D. Attempt ANY ONE of the following

i) Prove by using mathematical induction that $n(n+1)(n+5)$ is divisible by 3 for all $n \in \mathbb{N}$.

ii) Prove by mathematical induction that $41^n - 14^n$ is multiple of 27 for all $n \in \mathbb{N}$.

E. Attempt ANY ONE of the following.

(i) In how many ways 4 cards can be chosen from 52 playing cards?

In how many of these all 4 cards

a) are of the same suit.

b) belongs to different suit.

c) are face cards.

d) are of the same colour.

(ii) In how many ways can the letters of the word 'ASSASSINATION' be arranged? In how many of these words, 'S' will be together?

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MODEL QUESTION PAPER- Second Term Examination

Time : 2½ hrs.
: 80

Max Marks

GENERAL INSTRUCTIONS:

- This question paper contains seven main questions.
- All seven questions are compulsory.
- Use of calculator is not allowed.
- Log tables will be supplied on request.
- Graphs should be drawn on the answer paper only.
- For each main questions the sub questions carry the following marks:
A = 1 mark, B = 2 marks, C = 3 marks, D = 4 marks, E = 5 marks.

- 1.A. If $y = \tan x$ then write $\frac{dy}{dx}$.
- B. Find a positive value of m for which the coefficient of x^2 in the expansion $(1 + x)^m$ is 6.
- C. Evaluate $(99)^4$ using binomial theorem.
- D. Find the term independent of x in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^6$
- 2.A. Select and write the correct alternative from those given below
Modulus of complex number $3 - 4i$ is
- i) 3 ii) 4 iii) 5 iv) 6
- B. Find distance between the points $(-3, 7, 2)$ and $(2, 4, -1)$
- C. Find the angles between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$
- D. Find the equation of the line passing through the point $(2, 2)$ and cutting off intercepts on the axes whose sum is 9.
- 3.A. Find slope of the line passing through the points $(3, 5)$ and $(4, 3)$.
- B. Find the focus and the length of the latus rectum for the parabola $x^2 = -20y$
- C. Find the equation of the hyperbola with vertices $(\pm 7, 0)$ and $e = \frac{4}{3}$
- D. Attempt any one of the following.
- i) Prove that $\frac{\sin 7x + \sin 5x + \sin 9x + \sin 3x}{\cos 7x + \cos 5x + \cos 9x + \cos 3x} = \tan 6x$
- ii) Find the value of $\tan \frac{\pi}{8}$
- 4.A. State the octant in which the point $(-3, -1, 2)$ lies.

- B. Simplify $\frac{2-3i}{4+3i}$ in the form of $z = a + ib$
- C. If $\tan x = \frac{-5}{12}$; x lies in the second quadrant, find the values of the other five trigonometric functions.
- D. The slope of a line is double of the slope of another line. If tangent of the angle between them is $\frac{1}{3}$; find the slopes of the lines.
- 5.A. Select and write the correct alternative from those given below.
Eccentricity e of a parabola is _____
i. $e = 0$ ii. $e > 1$ iii. $e < 1$ iv. $e = 1$
- B. Find the middle term in the expansion of $(\frac{x}{3} + 9y)^{10}$
- C. Evaluate $\lim_{x \rightarrow 0} \frac{3\sin x - \sin 3x}{x^3}$
- D. Answer following questions.
- Write component statements of the statement "All living things have two legs and two eyes".
 - Write the contra positive of the statement "If a number is divisible by 3, then it is divisible by 9".
- 6.A. Define 'probability of an event'.
- B. Define i) Parabola. ii) Octant
- C. Find the probability that a leap year selected at random will have 53 Sundays.
- D. Find the co-ordinates of the points which trisect the line segment joining the points P(4, 2, -6) and Q(10, -16, 6)
- E. Attempt any one of the following
- If $y = (x^2 + 3)(3x^5 + \cos x - 5)$, find $\frac{dy}{dx}$
 - If $y = \frac{\sin x}{2x+1}$; find $\frac{dy}{dx}$
 - If $f(x) = \operatorname{cosec} x$, then find derivative of $f(x)$ by using definition.
- 7.A. Evaluate $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$
- B. If $y = x^4 + 3\sqrt{x} - \frac{1}{x} + 5$ find $\frac{dy}{dx}$
- C. On her vacation, Veena visits four cities A, B, C & D in a random order. What is the probability that she visits
- A before B.
 - A either first or second
- D. Find the equation of the circle passing through the points (1, -2), (5, 4) & (10, 5)

E. Attempt any one of the following.

- i) In how many ways can the letters of the word PERMUTATIONS be arranged if a) word starts with P and ends with S b) there are always 4 letters between P and S.
- ii) If the letters of the word AGAIN are arranged as in dictionary, then what is the 50th word?