



Mathematics – XI Model Sample Papers for 2016-17 (Annual)

ATP Education Model Sample Paper -1

Mathematics – XI

Time: 3 hours

Maximum Marks: 100

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, section B comprises of 13 questions of 4 marks each and section C comprises of 7 questions of six marks each.

(iii) All questions in section A are to be answered in one word, one sentence or as per the exact requirement of the question.

(iv) There is no overall choice. However internal choices have been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of calculator is not permitted.

SECTION - A

- Q1. Write the first five terms of the sequences $a_n = (-1)^{n-1}5^{n+1}$
- Q2. Find the domain and the range of the real function f defined by $f(x) = \sqrt{x-1}$.
- Q3. Find the value of $\tan 15^\circ$.
- Q4. Find the ratio in which the YZ-plane divides the line segment formed by joining the points $(-2, 4, 7)$ and $(3, -5, 8)$.
- Q5. Find a positive value of m for which the coefficient of x^2 in the expansion $(1+x)^m$ is 6.
- Q6. There are four men and six women on the city council. If one council member is selected for a committee at random, how likely is it that it is a woman?
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SECTION – B

Q7. Determine n if

(i) ${}^{2n}C_3 : {}^nC_3 = 12 : 1$

Q8. Write the relation $R = \{(x, x^3) : x \text{ is a prime number less than } 10\}$ in roster form.

Q9. Prove the identity:

$$\frac{\sin x - \sin y}{\cos x + \cos y} = \tan \frac{x-y}{2}$$

Q10. A letter is chosen at random from the word 'ASSASSINATION'. Find the probability that letter is

(i) a vowel (ii) a consonant

Q11. Prove that : $\sum_{r=0}^n 3^r {}^nC_r = 4^n$

Q12. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of:

(i) exactly 3 girls ?

(ii) atleast 3 girls ?

(iii) atmost 3 girls ?

Q13. If the origin is the centroid of the triangle PQR with vertices P $(2a, 2, 6)$, Q $(-4, 3b, -10)$ and R $(8, 14, 2c)$, then find the values of a, b and c .

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Q14. Find the derivatives:

$$(x + \sec x) (x - \tan x)$$

Q15. Insert two numbers between 3 and 81 so that the resulting sequence is G.P.

Q16. Prove that $3^{2n+2} - 8n - 9$ is divisible by 8 by using the principle of mathematics induction for all $n \in \mathbb{N}$.

Q17. A and B are two events such that $P(A) = 0.54$, $P(B) = 0.69$ and $P(A \cap B) = 0.35$.

Find (i) $P(A \cup B)$ (ii) $P(A' \cap B')$ (iii) $P(A \cap B')$ (iv) $P(B \cap A')$

Q18. A rod of length 12 cm moves with its ends always touching the coordinate axes. Determine the equation of the locus of a point P on the rod, which is 3 cm from the end in contact with the x-axis.

Q19. Show that the following statement is true by the method of contrapositive.

p: If x is an integer and x^2 is even, then x is also even.

SECTION - C

Q20. Find the derivative of $\cos x$ from first principle.

Q21. Find the sum to n terms of the series $3 \times 8 + 6 \times 11 + 9 \times 14 + \dots$

Q22. Find the square root of $1 + i$.

Q23. Find the value of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$ if $\sin x = \frac{1}{4}$, x in quadrant II.

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- Q24. In a group of 70 people, 37 like coffee, 52 like tea and each person likes at least one of the two drinks. How many people like both coffee and tea?
- Q25. How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid content?
- Q26. The diameters of circles (in mm) drawn in a design are given below:

Diameters	33 - 36	37 - 40	41 - 44	45 - 48	49 - 52
No. of Circles	15	17	21	22	25

Calculate the standard deviation and mean diameter of the circles.

***** *The Best Of Luck* *****