

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. Find the number of terms in the expansion of $(3x + y)^8 - (3x - y)^8$.

Q2. Evaluate $\lim_{x \rightarrow 3} \frac{e^x - e^3}{x - 3}$

Q3. Find the distance between the parallel lines $15x + 8y - 34 = 0$ and $15x + 8y + 31 = 0$

Q4. Find the argument of the complex number $Z = (\sin \frac{\pi}{6} + i \cos \frac{\pi}{6})$

Q5. If $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$. Find $P(A \text{ or } B)$, if A and B are mutually exclusive events.

Q6. Find the eccentricity of ellipse whose length of major and minor axes are equal.

SECTION - B

Q7. Convert the complex number $\frac{-16}{1+i\sqrt{3}}$ into polar form .

Q8. Prove that $\sin 3x + \sin 2x - \sin x = 4 \sin x \cos \frac{x}{2} \cos \frac{3x}{2}$

Or (अथवा)

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Prove that $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2 \cos 8\theta}}} = 2 \cos \theta$

Q9. Find the domain and range of the rear function $F(x) = \frac{1}{1-x^2}$

Q10. If the sum of n terms of an A.P is $(3n^2 + 5n)$ and its m^{th} term is 164. Find the value of m.

Q11. Find the equation of line in general from joining the points $(at_1^2, 2at_1)$ and $(at_2^2, 2at_2)$

Q12. Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 + \cos 2x}{(\pi - 2x)^2}$

Or (अथवा)

Find the derivative of f from the first principal where f is given by $f(x) = \frac{2x+3}{x-2}$

Q13. Find the equation of parabola whose focus is $(-3, 2)$ and equation of directrix is $x + y = 4$.

Q14. How many number greater than 10,00,000 can be formed by using the digits 1, 2, 0, 2, 4, 2, 4 ?

Q15. Find two numbers whose arithmetic mean is 34 and geometric mean is 16.

Q16. Four cards from a pack of 52 cards are choosen at random. Find the number of ways when?

- (i) Four cards are of same suit.
- (ii) Four cards belong to four different suits.
- (iii) Four cards are face cards.

Q17. Find 'r' if ${}^5P_r = 6 {}^5P_{r-1}$

Q18. Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5 \dots (2n-1)2^n x^n}{n!}$,

where n is a positive integer.

Or (अथवा)

Find n, if the ratio of fifth term from beginning to the fifth term from the end in the expansion of $[\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}]^n$ is $\sqrt{6} : 1$

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Q19. Draw the graph of the function $f(x) = 1 + |x - 1|$, also find the range of $f(x)$

SECTION - C

Q20. Solve the following system of inequalities graphically. $2x + y \geq 4$, $x + y \leq 3$, $2x - 3y \leq 6$

Q21. Using principal of mathematical induction, prove that $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$

Q22. Prove that $\sin^3 x + \sin^3 \left(\frac{2\pi}{3} + x\right) + \sin^3 \left(\frac{4\pi}{3} + x\right) = \frac{-3}{4} \sin 3x$

Or (अथवा)

Find the general solution of $\cos \theta \cdot \cos 2\theta \cos 3\theta = \frac{1}{4}$

Q23. Convert the complex number $\frac{1 + 7i}{(2 + i)^2}$ into polar form.

Q24. A Solution of 8 % boric acid is to be diluted by adding 2 % boric acid solution to it. The resulting mixture is to be more than 4 % but less than 6 % boric acid. If we have 640 liter of 8 % solution, how many liter of 2 % solution will have to be added?

Q25. A four digit numbers greater than 5000 are randomly formed from the digits 0, 1, 3, 5 and 7. What is probability of forming a number divisible by 5 when

- (i) The digits may be repeated
- (ii) The repetition of digits not allowed.

Q26. Let S be the sum, P the product and R the sum of reciprocals of n terms in a G.P.

Prove that $p^2 R^n = s^n$.

Or (अथवा)

Find mean and standard deviation for the following distribution

CLASSES	0 - 30	30 - 60	60 - 90	90 - 120	120 - 150	150 - 180	180 - 210
FREQUENCY	2	3	5	10	3	5	2