

HIGHER SECONDARY MODEL QUESTION PAPER 2012
TIME ;3Hr

MATHEMATICS

Max.mark ;80

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- 1. Consider a set A and B given by $A = \{x / x \text{ is a prime number } < 12 \}$
 $B = \{x / x \text{ is a natural number which divides } 15\}$ then find
 - a) write A and B in Roster form (2)
 - b) Find $A \cup B$ and $A \cap B$ (1)
 - c) Verify that $(A \cup B)' = A' \cap B'$ (2)
- 2. a) If $((x/3)+1, y-(2/3)) = ((5/3), (1/3))$ then find x and y (1)
 - b) i) Define Modulus function (1)
 - ii) Write the Domain and Range of Modulus function (2)
 - iii) Draw the Graph of above function (2)
- 3. a) Convert $(11/16)$ radian into Degree measure (1)
b) If $\sin(x) = 3/5$ x lies in 2nd quadrant then find $\cos(x)$ and $\tan(x)$ (2)
- 4. Solve $\sin x + \sin 3x + \sin 5x = 0$ (3)
- 5. Consider the statement $1/2 + 1/4 + 1/8 \dots + 1/2^n = 1 - (1/2^n)$
 - a) Is P(2) is true (1)
 - b) Assuming P(k) is true, Prove that P(k+1) is true (3)
- 6. Consider the complex number $Z = -161 + i\sqrt{3}$
 - a) Express Z in the form $a + ib$ (3)
 - b) Represent Z in the polar form (2)
- 7. a) Solve the inequality $3(x-2)^5 \leq 5(2-x)^3$ (2)

b) Solve the following system of inequalities graphically
 $3x + 2y \leq 12, y \geq 2, x \geq 1$ (3)

8 (i) Find n if ${}^{n-1}P_3 : {}^nP_4 = 1:9$ (2)

ii) How many words with or without meaning from the letter of the word MONDAY, assuming that no letter is repeated, if 4 letters are used at a time.

(iii) How many chords can be drawn through 21 points on a circle (2)

OR

8. (i) $18! + 19! = x10!$ then find x (2)

(ii) How many 3 digits numbers can be formed by using the digits 1 to 9 if no digit is repeated (2)

(iii) A bag contains 5 Black and 6 Red balls. Determine the number of ways in which 2 Black and 3 Red Balls can be selected (3)

9. a) Find the fourth term in the expansion of $(x-2y)^{12}$ (2)

b) Expand $(x^3+y^2)^6$ (2)

10. a) Insert 6 numbers between 3 and 24 such that resulting sequence is A.P (2)

b) Given G.P with $a=729$ and 7th term 64 determine S_7 (2)

c) Find the sum to n terms $3 \times 8 + 6 \times 11 + 9 \times 14 \dots$ (2)

11. a) Write the equation of the line passing through the points $(3,-2)$ and $(-1,4)$ (2)

b) Reduce the equation into slope-intercept form and intercept form $3x+2y-12=0$ (2)

c) Find the equation of the line perpendicular to the line $x-2y+3=0$ and passing through the point $(1,-2)$ (2)

12. a) Find the centre and radius of the circle $(x+5)^2+(y-3)^2=36$ (2)

b) Find the eccentricity, foci and length of latus rectum of the ellipse $\frac{x^2}{36}+\frac{y^2}{16}=1$ (2)

13. Verify that $(0,7,-10), (1,6,-6),$ and $(4,9,-6)$ are the vertices of an isosceles triangle (2)

b) Find the ratio in which the line segment joining the points (1,2,3) and (-1,-2,4) is divided by the YZ-plane

(2)

14. a) Evaluate $\lim_{x \rightarrow 1} x^2 + 5x + 6x^3 + 4x^2 - 10$ (1)

b) Evaluate $\lim_{x \rightarrow 3} x^2 - 5x + 6x^2 - 7x + 12$

(2)

15. Find the derivative of $\cos x$ from the first principle (3)

OR

Differentiate $X + 2\sin X + \cos X$

16. a) Write Contra positive and Converse of the statement - If a number is divisible by 9, then it is divisible by 3

(2)

b) Verify by the method of contradiction $\sqrt{2}$ is irrational

(2)

17. Find the mean and compute the mean deviation about the mean for the following data (5)

Marks Obtained	Number of students
10-20	2
20-30	3
30-40	8
40-50	14
50-60	8
60-70	3
70-80	2

19.

a) A coin is tossed twice, what is the probability that at least one tail occurs.

(2)

b) If E and F are events such that $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(E \text{ and } F) = \frac{1}{8}$.

Find $P(E \text{ or } F)$ and $P(\text{not } E \text{ and not } F)$

(2)

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