

MATHEMATICS

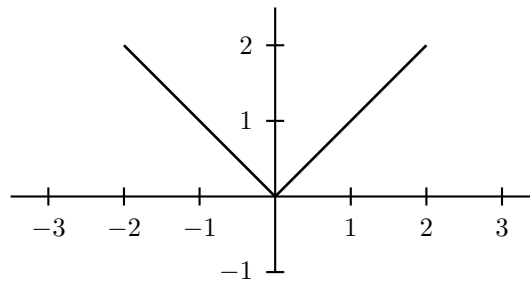
Model Examination 2012

Time : $2\frac{1}{2}$ Hours

Cool off time : 15 Minutes

Maximum : 80 Score

1. (a) $A = \{x : x^2 - 7x + 12 = 0, x \in R\}$. Represent A in roaster form. (1)
- (b) Given $B = \{2, 4, 6, 7, 8\}$. Find (i) $A \cup B$ (ii) A' and (iii) B' . (1)
- (c) Verify De-Morgans law using the above sets A and B . (1)
- (d) In a group of students , 100 like Mohanlal , 60 like Mammooty, And 40 like both . Each of them like either of the two. Then.
- i. How many students are ther in the group? (1)
- ii. How many like Mohanlal only? (1)
2. (a) Given the relation $R_1 = \{(x, y) : x, y \in N, \text{ and } x + y = 6\}$ Find the domain(D) and range (R) of R_1 (2)
- (b) Find $D \times R$ (2)
- (c) Identify the function $f(x)$ from the graph given below. Also Find the value of $f(-2)$. (2)



3. (a) Fill in the blanks (2)

Radian	$\frac{5\pi}{6}$	$\frac{\pi}{3}$
Degree	120^0	45^0

- (b) A horse is tied to a stake by a rope 30m long . If the horse moves along the Circumference of a circle by keeping the rope tight ,find how far it will have gone when the rope has traced an angle of 105^0 ? (2)
- (c) Show that $\frac{\sin 3x}{\sin x} + \frac{\cos 3x}{\cos x} = 4 \cos 2x$ (2)

4. $P(n)$ is given by the statement $P(n) = 2^n > 3n$
- Is $P(1)$ is true ? (1)
 - Show that if $P(k)$ is true, $P(k + 1)$ is also true. (2)
 - Write the set of natural numbers for which $P(n)$ is not true. (1)
5. (a) Express $Z = \frac{1 + 2i}{1 - 3i}$ in the form of $a + ib$. (2)
- (b) Express the above complex number in polar form. (3)
6. (a) Solve the inequality $3(x - 1) \leq 2(x - 3)$ for all real x (2)
- (b) Solve the following system of linear inequalities Graphically. (3)

$$2x + y \geq 4$$

$$x + y \leq 3$$

$$2x - 3y \leq 6$$

7. (a) Find r , if ${}^5P_r = {}^6P_{r-1}$ (2)
- (b) How many words with or without meaning that can be made from the letters of the word MATHEMATICS. (2)
- (c) In how many ways a committee of 5 members can be selected from 6 men and 5 women if the committee should contain 3 men 2 women ? (2)

OR

- (a) If ${}^{2n}C_3 : {}^n C_2 = 12 : 1$, Find n . (2)
- (b) If the letters of the word 'PERMUTATIONS' is arranged between themselves, find number of words starting with P and end in S. (2)
- (c) Determine the number of 5 card combinations out of a deck of 52 cards if there should be exactly one ace in each combination. (2)
8. (a) Find the number of terms in the Binomial Expansion of $(3x - \frac{6}{x^3})^7$. (1)
- (b) Find the general term of the above expansion. (1)
- (c) Find the coefficient of the term containing x^3 . (2)
9. (a) Find the 10th term of the G.P $-\frac{3}{4}, \frac{1}{2}, -\frac{1}{3}, \dots$ (1)
- (b) The 6th and 17th terms of an A.P are 19 and 41 respectively, find the 40th term. (2)
- (c) The sum of the first 3 terms of a G.P is $\frac{39}{10}$ and their product is 1. Find the common ratio and hence write the G.P. (3)
10. (a) Find the slope of the line passing through the points (2, 5) and (-3, 6). (1)
- (b) Find the equation of the line passing through (-3, 5) and perpendicular to the above line. (2)
- (c) Find the co-ordinates of the foot of the perpendicular from the point (-1, 3) to the line $3x - 4y - 16 = 0$. (3)
11. (a) Find the focus and the equation to the directrix of the parabola $x^2 = 12y$. (2)
- (b) Find the equation of the ellipse having vertices (5, 0), (-5, 0) and focus at (4, 0), (-4, 0). (2)

12. (a) Find the ratio in which the line segment joining the points $(4, 8, 10)$ and $(6, 10, -8)$ is divided by the YZ -plane. (2)
- (b) The centroid of the triangle PQR with vertices $P(2a, 2, 6)$, $Q(-4, 3b, -10)$ and $R(8, 14, 2c)$ is the origin. Find the values of $a, b,$ and c . (2)
13. (a) $\lim_{x \rightarrow 0} \frac{\sin x}{x} = \dots$ (1)
- (b) Evaluate $\lim_{x \rightarrow 0} \frac{\sin ax}{\sin bx}$, $a, b \neq 0$. (1)
- (c) $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = \dots$ (1)
- (d) Evaluate $\lim_{x \rightarrow a} \frac{x^5 - 32}{x^3 - 8}$. (2)
14. Find the derivative of $\tan x$ using first principle. (3)
15. (a) Write the converse of the statement p : If x is a prime number then x is odd. (1)
- (b) Consider the compound statement p : $2 + 2 = 4$ or 6
- Write the component statements. (2)
 - Is the compound statement true ? Why ? (1)
16. Find the mean ,variance and standard deviation from the following data (5)

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
No.of students	5	11	20	10	4

17. (a) Consider the experiment
A coin is tossed , If it shows a tail, we draw a ball from a box containing 2 red and 3 black balls. If it shows a head we throw a die .Write the sample space of the above experiment. (2)
- (b) 2 students A and B appear for an examination ,the probability that A will qualify the examination is 0.05 and that B will qualify the same is 0.10. The probability that both will qualify the exam is 0.02. Find the probability that
- Both of them will not qualify the examination. (1)
 - Only one of them qualify the examination. (1)

Cherpulassery Sub Dt, Palakkad