

FIRST YEAR HIGHER SECONDARY MODEL EXAMINATION FEBRUARY 2012
PART III
MATHEMATICS (SCIENCE)
Maximum : 80 score

Time : 2 ½ hrs.
Cool off time : 15 min.

General Instructions:-

- There is a cool off time of 15 min in addition to the writing time of 2 ½ hrs.
- You are not allowed to write answers or discuss anything with others during cool off time.
- Cool off time is for familiarizing questions and planning answers.
- All questions are compulsory and only internal choice is allowed.
- When you select a question all the sub questions must be answered from the same question itself.

1. Consider

$$A = \{ 1,2,3,4,5 \}$$

$$B = \{ 2,3,5,7,11 \}$$

$$C = \{ a,e,i,o,u \}$$

(i) Write A,B,C in set builder form. (3)

(ii) Verify that $A \cap (B \cap C) = (A \cap B) \cap C$ (2)

2. If $R = \{ (x, x^2) / x \in A \}$ is a relation on $A = \{ 0, -2, 5 \}$

(i) Write domain of R. (1)

(ii) Write range of R. (1)

3. (i) Draw the graph of $f: \{-2, -1, 0, 1, 2\} \rightarrow \mathbb{R}$ by $f(x) = x^3$ (3)

(ii) Is it a real valued function ? (1)

4. (i) Find radian measure corresponding to 120° (1)

(ii) If $\sin x = \sqrt{3}/2$, x lies in the second quadrant, find $\cos x$ and $\tan x$. (2)

5. Show that $3 \sin \pi/6 \sec \pi/3 - 4 \sin 5\pi/6 \cot \pi/4 = 1$ (3)

6. Consider the statement “ $5^n - 3^n$ is divisible by 2 ”

(i) Verify the result for $n = 2$ (1)

(ii) Prove the statement using mathematical induction. (3)

7. (i) Express the complex number $z = \frac{(1+i)}{(1-i)}$ in $a+ib$ form (2)

(ii) Represent z in modulus amplitude form. (3)

8. (i) Solve the inequality. $\frac{(5x - 2x)}{3} \leq \frac{x}{6} - 5$ (2)

(ii) Solve the system of inequalities graphically.
 $x+2y \leq 8, 2x+y \leq 8, x \geq 0, y \geq 0$. (3)

9. (i) Find r , if $5 \cdot 4P_r = 6 \cdot 3P_{r-1}$ (3)

- (ii) How many words with or without meaning, each of 3 vowels and 2 consonants can be formed from INVOLUTE? (3)

OR

- (i) If $nC_9 = nC_8$ find nC_{17} (3)
- (ii) In how many ways can a student choose a programme of 5 courses, if 9 courses are available and 2 specific courses are compulsory for every student? (3)
10. (i) Find the general term of $\left[\frac{3}{2}x^2 - \frac{1}{3x} \right]^6$ (2)
- (ii) Find the term independent of x in the above expansion. (2)
11. (i) If a, b, c are in GP and $a^{1/x} = b^{1/y} = c^{1/z}$, prove that x, y, z are in AP (3)
- (ii) Find the sum to n terms of the series whose n^{th} term is $n(n+3)$ (3)
12. (i) Find the slope of the line $y - 2x - 3 = 0$ (1)
- (ii) Reduce the equation $\sqrt{3}x + y - 8 = 0$ into normal form. (2)
13. (i) Write x and y intercepts of $3x - 4y - 26 = 0$ (1)
- (ii) Find the distance of $(3, -5)$ from the above line (2)
14. (i) Find the center and radius of the circle $x^2 + y^2 = 5$ (1)
- (ii) Find the focus, axis, directrix and latus rectum of the parabola $y^2 = 8x$ (3)
15. (i) What is the x coordinate of any point in the YZ plane? (1)
- (ii) Find the ratio in which the line segment joining the points $(4, 8, 10)$ and $(6, 10, -8)$ is divided by YZ plane (3)
16. (i) Evaluate $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$ (2)
- (ii) Evaluate $\lim_{x \rightarrow 1} \frac{x^2 - 1}{101 - x}$ (1)
17. If $f(x) = \frac{x^{100}}{100} + \frac{x^{99}}{99} + \frac{x^{98}}{98} + \dots + \frac{x^2}{2} + \frac{x}{1} + 1$ Prove that $f'(1) = 100 f'(0)$ (3)
- OR
- Find the derivative of $1/x$ from the first principle (3)
18. (i) Write the negation of "Trivandrum is not the capital of Kerala" (1)
- (ii) Verify by the method of contradiction $\sqrt{3}$ is irrational. (3)
19. Consider the numbers 6, 7, 10, 12, 13, 4, 8, 12
- (i) Find mean (1)
- (ii) Calculate mean deviation about mean (2)
- (iii) Find variance (2)
20. In a relay race there are 5 teams. A, B, C, D and E
- (i) What is the probability that A finish first, B finish second, C finish third (2)
- (ii) What is the probability that A, B, C are first three to finish in any order by considering all the finishing orders are equally likely. (2)