

HIGHER SECONDARY EXAMINATION 2011-12
PART-III
Mathematics

XI

Total Marks : 80

1. $U = \{1, 2, 3, \dots, 10\}$
A = Set of all prime numbers less than 10.
B = Set of all even numbers less than 11.
 - a. Write A, B in roster form (1)
 - b. Find A', B' (1)
 - c. Verify $(A \cup B)' = A' \cap B'$ (2)

2. In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like?
 - a. Tennis only but not like cricket (1)
 - b. How many like Tennis (1)

3. If $(x-y, 2) = (4, x)$ Find the
 - a. Value of x, y ? (1)
 - b. If $A = \{a, b\}$ $B = \{-1, 0\}$. Find $A \times B, B \times A$? (1)

4.
 - a. Write the domain and range of signum function? (1)
 - b. If $A = \{1, 2, 3\}$ $B = \{2, 3, 4\}$ and R is a relation from A to B. Defined by $R = \{(x, y) / x < y, x \in A, y \in B\}$. Depict the relation R? (2)

5.
 - a. Convert $19\pi/3$ into degree measure. (1)
 - b. Find the value of $\sin 19\pi/3$ (1)
 - c. Prove that $\frac{\sin 2x}{(1-\cos 2x)} = \cot x$ (2)
 - d. Solve $\sin 2x + \cos x = 0$. (2)

6. If $P(n) = 1.2 + 2.3 + 3.4 + \dots + n(n+1) = n \frac{(n+1)(n+2)}{3}$
 - a. Prove P(1) (1)
 - b. Using mathematical induction. Prove P(n) (2)

7.
 - a. Express $z = \frac{1-i}{1+i}$ in $a+ib$ form (2)
 - b. Convert the above complex number in polar form (2)
 - c. Solve $\sqrt{2}x^2 + x + \sqrt{2} = 0$ (2)

8. a. Solve $3(x-2)/5 \leq 5(2-x)/3$ if x is a real number (2)
b. Solve graphically the following system of linear inequalities.
 $2x + y \geq 4$, $x+y \leq 3$, $2x-3y \leq 6$ (3)

9. a. Find r if ${}^4P_r = 6 \cdot {}^5P_{r-1}$ (2)
b. How many 4 digit numbers are there with no digit repeated? (2)

or

- a. Find n if ${}^{2n}C_3 : {}^nC_3 = 11 : 1$ (2)
b. A bag contains 5 black, 6 red balls. Find the number of ways in which 2 black and 3 red balls can be selected. (2)

10. a. Find the general term in the expansion of $\left[x - \frac{1}{3x}\right]^6$ (2)

- b. Also find the term independent of x in the above expansion. (2)

11. a. Find the sum of n terms of the series $7 + 77 + 777 + \dots$ (2)
b. Find the two numbers a and b such that their arithmetic mean is 10 and Geometric mean is 8 (3)
c. In an AP m^{th} term is n and n^{th} term is m . Find p^{th} term? ($m \neq n$) (2)

12. Consider a straight line $x-2y + 3 = 0$

- a. Find the slope of this straight line (1)
b. Find the slope of straight line which is perpendicular to given line. (1)
c. Find the equation of the line perpendicular to the given line and passing through $(1, -2)$? (2)
d. Find the distance of the point $(3, -5)$ from the above given line? (2)

13. a. Find the centre and radius of the circle $x^2 + y^2 - 8x + 10y - 12 = 0$. (2)
b. Find the co-ordinate of the vertices, foci, eccentricity, length of major axis length of minor axis and length of major axis of the ellipse. (3)
 $x^2/9 + y^2/16 = 1$

14. a. Verify $(0, 7, 10)$, $(-1, 6, 6)$, $(-4, 9, 6)$ are the vertices of a right angled triangle. (2)
b. Find the ratio in which YZ plane divides the line segment formed by joining the points $(-2, 4, 7)$ and $(3, -5, 8)$ (2)

15. a. Evaluate $\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 2x}$ (1)
b. Evaluate $\lim_{x \rightarrow 2} \frac{x^3 - 2x}{x^2 - 5x + 6}$ (1)
c. Using first principle find the derivative of $\sin x$ (3)

or

- a. Evaluate $\lim_{x \rightarrow 3} \frac{x^3 - 27}{x - 3}$ (1)
- b. Evaluate $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x^2}$ (2)
- c. Using first principle find the derivative of x^2 (3)
16. a. Write the negative of the following statement.
“Both the diagonals of a rectangle have the same length“ (1)
- b. Verify by method of contradiction “ $\sqrt{7}$ is irrational” (2)
17. Consider the following data
6, 7, 10, 12, 4, 8, 13
- a. Find the mean for the above data (2)
- b. Find the standard deviation for the above data (3)
18. A coin is tossed three times. Consider the events
- A. The event “exactly one head appears
B. Atleast one head appears
C. Almost one head appears
- a. Write the sample space (1)
- b. Do A, B, C form a set of exhaustive events (2)
- c. Find the probability of A or B and the probability of not C (2)

Prepared by

- | | |
|--|---|
| 1. Subha. A.B
HSST, GHSS Mankara | 6. Asha Menon. T
HSST,
CAHSS Coyalmannam |
| 2. Hari Prasad. K.P
HSST, Parli HSS Parli | 7. Subhadra. A.N
HSST, HSS Kuthanur |
| 3. Sushama. P.C
HSST, HSS Keralassery | 8. Oleena. K.S
HSST
GHSS Peringottukurussi. |
| 4. P. Geetha,
HSST, KPRPHSS
Kongad | 9. Priya. K.M
HSST, GHSS Pathiripala. |
| 5. Mrudula. M
HSST, HSS Mundur | |