MATHEMATICS
Goa Board Model Paper : Unsolved
Second Term : 2022

1 (A) Select and write the most appropriate alternative from those provided in the bracket : [1]
If $2k$, $(k+10)$ and $(3k+2)$ are in arithmetic progression, then the value of k is :
[2, 10, 12, 6]

(B) Attempt the following : [2]

(i) A shoe vendor wants to survey the residents of a town where he wishes to sell his shoes. Which is the most appropriate measure of central tendency that he should calculate so as to maximize his profits ?

(ii) The n^{th} term of an arithmetic progression 4, 1, – 2, –5, ... is – 56. Find the value of n.

(C) Draw two concentric circles of radii 3 cm and 5 cm. Take a point P on the outer circle. Using a pair of compasses and ruler construct a pair of tangents PA and PB to the inner circle. Measure and state the length of the tangent segments. [3]

(D) (i) The 10^{th} term of an arithmetic progression is 52. If the 17^{th} term exceeds its 13^{th} term by 20, then find the first term and the common difference. [2]

(ii) The first term and the last term of an arithmetic progression are 1 and 20 respectively. If the sum of all the terms is 420, then find the number of terms. [2]

2 (A) Select and write the most appropriate alternative from those provided in the bracket : [1]
In a grouped frequency distribution the frequency of the class intervals 10 - 15, 15 - 20, 20 - 25 and 25 - 30 are 3, 7, 5 and 4 respectively. Therefore, the lower limit of the modal class is :
[10, 15, 20, 25]

(B) The following frequency distribution shows the heights (in cm) of 50 students. [2]

Height (in cm) (C . I)	145 -150	150 - 155	155 - 160	160 - 165	165 - 170
Number of students (f)	12	14	11	7	6

Find the median height of the given data.

(C) Using a pair of compasses and ruler construct ΔABC in which $AB = 4.5$ cm , $\angle B = 120^0$ and $BC = 5.6$ cm. Then, construct another $\Delta A'BC'$ similar to ΔABC each of whose sides are $\frac{5}{4}$ times the corresponding sides of ΔABC. [3]

(D) The daily pocket money of 60 college students is given in the following frequency distribution table. [4]

Pocket money in ₹ (C . I)	No. of students (fi)	Class mark (xi)	Deviation di = xi – a	fidi
80 - 100	12			
100 - 120	8			
120 - 140	14			
140 - 160	9			
160 - 180	11			
180 - 200	6			
Total	Σ fi=60			Σ fidi =

Taking the class mark (denoted by 'a') of the class interval 80 -100 as the assumed mean, rewrite and complete the table and also find the mean amount of pocket money by the assumed mean method.

3 (A) Select and write the most appropriate alternative from those provided in the bracket : [1]

The end points of the diameter of a circle are $(-11, 7)$ and $(5, -5)$. Therefore the coordinates of the centre of the circle is:

$[(-3, -1), (3, 1), (3, -1), (-3, 1)]$

(B) Find the area of Δ KMN whose vertices are K$(-4, -5)$, M$(-5, 7)$ and N$(4, 5)$. [2]

(C) Find the ratio in which y - axis divides the line segment joining the points A$(5, -6)$ and B$(-1, 4)$. Also, find the coordinates of the point of division. [3]

(D) Attempt the following :

(i) If A$(4, 3)$, B$(-1, k)$ and C$(3, 4)$ are the vertices of a right Δ ABC right angled at A , then find the value of k. [2]

(ii) Find the relationship between x and y if the point P(x, y) is equidistant from the points A$(2, 5)$ and B$(-3, 7)$. [2]

4 (A) Select and write the most appropriate alternative from those provided in the bracket : [1]

The equation which can be reduced to the quadratic form; where $x \neq 0$ is:

$[(x - \frac{1}{x} = 1), (x^2 + \frac{1}{x} = 1), (x^2 + 2\sqrt{x} - 1 = 0), ((\sqrt{x})^2 - 2^2 = 0)]$

(B) Attempt the following : [2]

(i) The equation $12x^2 + 4kx + 3 = 0$ has real and equal roots. Find the values of k.

(ii) The equation $mx^2 - 5x + n = 0$ has 10 as the sum of the roots and also as the product of the roots. Find the value of n.

(C) Find the roots of ANY ONE of the following quadratic equations: [3]

(i) $3x^2 - 7x - 20 = 0$ (by factorization method)

(ii) $5x^2 + 6x - 8 = 0$ (by quadratic formula method)

(D) A shopkeeper buys a certain number of books for ₹ 600 . If the price of each book is reduced by ₹ 5 , he can buy 10 more books for the same amount. Find the original list price of the books. [4]