**TIME: 3 hours**                                                                                    **MAX.MARKS: 80**

General Instructions:

Read the following instructions carefully and follow them:

**1.** This question paper contains 38 questions.

**2.** This Question Paper is divided into 5 Sections A, B, C, D and E.

**3.** In Section A, Questions no. 1-18 are multiple choice questions (MCQ's) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.

**4.** In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.

**5.** In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.

**6.** In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.

**7.** In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.

**8.** All Questions are compulsory. However, an internal choice in 2 questions of section A, 2 Questions of section B and 2 Questions of section C has been provided. An internal choice has been provided in the all 2 marks questions of Section E.

**9.** Draw neat and clean figures wherever required.

**10.**   Take π =22/7 wherever required if not stated.

**11.**   Use of calculators is not allowed.

|   | **Section A** |   |
|---|---|---|
|   | **Section A consists of 20 questions of 1 mark each.** |   |
| **1.** | HCF OF $(3^3 \times 5^2 \times 2), (3^2 \times 5^3 \times 2^2)$ $and$ $(3^4 \times 5 \times 2^3)$ is <br> (A) 450　　　　　(B) 90　　　　　(C) 180　　　　　(D) 630 | 1 |
| **2.** | If pair of linear equations is consistent, then the lines representing them are <br> (A) parallel　　　　　　　　　　　(B) only coincident <br> (C) either intersecting or coincident　　　(D) only intersecting | 1 |
| **3.** | The value of k for which the quadratic equation $kx^2 - 5x + 1 = 0$ does not have a real solution, is <br> (A) 0　　　　(B) $\frac{25}{4}$　　　　(C) $\frac{4}{25}$　　　　(D) 7 | 1 |
| **4.** | The distance between the points $(a, b)$ and $(-a, -b)$ is <br> (A) $\sqrt{a^2 + b^2}$　　　(B) $a^2 + b^2$　　　(C) $2\sqrt{a^2 + b^2}$　　　(D) $4\sqrt{a^2 + b^2}$ | 1 |

| | | |
|---|---|---|
| **5.** | If the angle between the two tangents drawn from an external point to a circle is 35°, then the angle subtended by the line-segment joining the points of contact at the centre of the circle will be <br> (A)145°          (B) 90°          (C) 180°          (D) 360° | 1 |
| **6.** | If $\triangle ABC \sim \triangle PQR$ such that 3AB = 2PQ and BC=10cm then length QR is equal to <br> (A) 10 cm          (B) 15 cm          (C) $\frac{20}{3}$ cm          (D) 30 cm | 1 |
| **7.** | If $3 \cot A = 4$, where $0° < A < 90°$, then $\sec A$ is equal to <br> (A) $\frac{5}{4}$          (B) $\frac{4}{3}$          (C) $\frac{5}{3}$          (D) $\frac{3}{4}$ | 1 |
| **8.** | In $\triangle ABC$ & $\triangle DEF$, $\angle B = \angle E$, $\angle F = \angle C$ and AB= 3DE then the two triangles are <br><br> (A) congruent but not similar          (B) similar but not congruent <br> (C) neither congruent nor similar          (D) congruent as well as similar | 1 |
| **9.** | If H.C.F(420,189) = 21 then L.C.M(420,189) is <br> (A) 420          (B) 1890          (C) 3780          (D) 3680 | 1 |
| **10.** | The $4^{th}$ term from the end of the A.P. $-8, -5, -2, \dots, 49$ is <br><br> (A) 37          (B) 40          (C) 1          (D) 43 | 1 |
| **11.** | If $\triangle ABC \sim \triangle DFE$ and $\frac{AB}{DE} = \frac{2}{3}$, then the ratio of their corresponding altitudes drawn from $A$ and $D$ to their opposite sides is <br><br> (A) $\frac{3}{2}$                                    (B) $\frac{4}{9}$ <br> (C) $\frac{1}{3}$                                    (D) $\frac{2}{3}$ | 1 |
| **12.** | A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Length PQ is <br> (A)12 cm          (B)13 cm          (C) 8.5 cm          (D) $\sqrt{119}$ cm | 1 |
| **13.** | $\frac{1-tan^2 30°}{1+tan^2 30°}$ is equal to <br> (A) $\cos 60°$          (B) $\sin 60°$          (C) 1          (D) $tan^2 60°$ | 1 |
| **14.** | The total surface area of solid hemisphere of radius $r$ is <br> (A) $\pi r^2$          (B) $2\pi r^2$          (C) $3\pi r^2$          (D) $4\pi r^2$ | 1 |
| **15.** | Which of the following cannot be the probability of an event? <br> (A) 0.4          (B) 4%          (C) 0.04%          (D) 4 | 1 |

| 16. | The roots of quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$ are<br>(A) not real   (B) real and equal   (C) rational and distinct   (D) irrational and distinct | 1 |
|---|---|---|
| 17. | The following distribution shows the marks distribution of 80 students.<br><br>| Marks | Below 10 | Below 20 | Below 30 | Below 40 | Below 50 | Below 60 |<br>|---|---|---|---|---|---|---|<br>| No. of students | 2 | 12 | 28 | 56 | 76 | 80 |<br><br>The median class is<br>(A) 20-30              (B) 40-50                    (C) 30-40                    (D) 10-20 | 1 |
| 18. | A quadratic polynomial whose zeroes are $\frac{2}{5}$ $and$ $\frac{-1}{5}$ is<br>(A) $25x^2 + 5x - 2$              (B) $5x^2 - 2x + 1$<br>(C) $5x^2 + 2x - 1$              (D) $25x^2 - 5x - 2$ | 1 |
|  | **DIRECTION:** In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.<br>Choose the correct option<br>A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)<br>B) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation assertion (A)<br>C) Assertion (A) is true but reason (R) is false.<br>D) Assertion (A) is false but reason (R) is true. |  |
| 19. | Assertion(A): The sequence $-1, -1 - 1, \ldots, -1$ is an AP.<br>Reason(R): In an AP, $a_n - a_{n-1}$ is constant where $n \geq 2$ and $n \in N$ | 1 |
| 20. | Assertion(A): $(2 + \sqrt{3})\sqrt{3}$ is an irrational number.<br>Reason(R): Product of two irrational numbers is always irrational. | 1 |
|  | **Section B** |  |
|  | **Section B consists of 5 questions of 2 marks each.** |  |
| 21(A). | $P(x, y)$ is a point equidistant from the points $A(4,3)$ and $B(3,4)$. Prove that $x - y = 0$. | 2 |
|  | **OR** |  |
| 21(B). | Show that the points ( -4, -1), ( -2,-4), ( 4, 0) and (2,3) are the vertices of a parallelogram. | 2 |

| 22. | In two concentric circles, a chord of length 8 cm of the larger circle touches the smaller circle. If the radius of the larger circle is 5 cm, then find the radius of the smaller circle. | 2 |
|---|---|---|
| 23(A). | The sum of the first 12 terms of an A.P. is 900. If its first term is 20 then find the common difference and 12$^{th}$ term. | 2 |
| | **OR** | |
| 23(B). | The sum of first $n$ terms of an A.P. is represented by $S_n = 6n - n^2$. Find the common difference. | 2 |
| 24. | If $sin(A - B) = \frac{1}{2}$ and $cos(A + B) = \frac{1}{2}, 0° < A + B < 90°$ and $A > B$, then find the values of $A$ and $B$. | 2 |
| 25. | Calculate mode of the following distribution: | 2 |

| Class | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 |
|---|---|---|---|---|---|---|
| Frequency | 5 | 6 | 15 | 10 | 5 | 4 |

**Section C**

**Section C consists of 6 questions of 3 marks each.**

| 26. | Prove that $\sqrt{5}$ is an irrational number. | 3 |
|---|---|---|
| 27. (A) | Find the ratio in which the y-axis divides the line segment joining the points $(4, -5)$ and $(-1, 2)$. Also find the point of intersection. | 3 |
| | **OR** | |
| 27(B). | Find the ratio in which the line $4x + y = 4$ divides the line segment joining the points $(-2, -1)$ and $(3, 5)$. | 3 |
| 28. | Prove that: $(cosecA - sinA)(secA - cosA) = \frac{1}{\tan A + \cot A}$. | 3 |
| 29. | Find the mean using the step deviation method. | 3 |

| Class | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
|---|---|---|---|---|---|
| Frequency | 6 | 10 | 15 | 9 | 10 |

| 30. (A) | From an external point P, two tangents PA and PB are drawn to a circle with centre O. At a point E on the circle, a tangent is drawn to intersect PA and PB at C and D, respectively. If PA = 10cm find the perimeter of ∆PCD. | 3 |
|---|---|---|
| | **OR** | |
| 30(B). | Prove that the lengths of tangents drawn from an external point to a circle are equal. | 3 |
| 31. | The sum of a two-digit number and the number obtained by reversing the order of its digits is 99. If ten's digit is 3 more than the unit's digit, then find the number. | 3 |
| | **Section -D** | |
| | **Section D consists of 4 questions of 5 marks each** | |
| 32 (A). | Amita buys some books for ₹1920. If she had bought 4 more books for the same amount each book would cost her ₹ 24 less, how many books did she buy? What was the initial price of one book? | 5 |
| | **OR** | |
| 32 (B). | A train travels at a certain average speed for a distance of 132 km and then travels a distance of 140 km at an average speed of 4 km/h more than the initial speed. If it takes 4 hours to complete the whole journey, what was the initial average speed? Determine the time taken by train to cover the distances separately. | 5 |
| 33. | If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio. | 5 |
| 34. | The perimeter of a sector of a circle of radius 6.3 cm is 25.8 cm, find the area of the sector. | 5 |
| 35 (A). | From the top of a 9 m high building, the angle of elevation of the top of a cable tower is $60°$ and angle of depression of its foot is $45°$. Determine the height of the tower and distance between building and tower. (Use $\sqrt{3} = 1.732$) | 5 |
| | **OR** | |
| 35 (B). | As observed from the top of a 75 m high lighthouse from the sea level, the angles of depression of two ships are $30°$ and $45°$. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships (Use $\sqrt{3} = 1.732$) | 5 |
| | **Section E** | |
| 36. | A group of students conducted a survey to find out about the preferred mode of transportation to school among their classmates. They surveyed 200 students from their school. The results of the survey are as follows:<br><br>120 students preferred to walk to school.<br>25% of the students preferred to use bicycles. | |

| | | |
|---|---|---|
| | 10% of the students preferred to take the bus.<br>Remaining students preferred to be dropped off by car.<br><br>Based on the above information, answer the following questions: | |
| **(i)** | What is the probability that a randomly selected student does not prefer to walk to school? | **1** |
| **(ii)** | Find the probability of a randomly selected student who prefers to walk or use a bicycle. | **1** |
| **(iii)(A)** | One day 50% of walking students decided to come by bicycle. What is the probability that a randomly selected student comes to school using a bicycle on that day?<br><div align="center">**OR**</div> | **2** |
| **(B)** | What is the probability that a randomly selected student prefers to be dropped off by car? | **2** |
| **37.** | Shibi decorated the door of his house with garlands on the occasion of Onam Each garland forms the shape of a parabola.<br>Based on the above information answer the following questions: | |
| **(i)** | Suppose the quadratic polynomial for the given curve is $ax^2 + bx + c$, then what will be the sign of a? | **1** |
| **(ii)** | Find a quadratic polynomial with the sum and product of its zeroes as $-1$ and $-2$ respectively. | **1** |
| **(iii)(A)** | For what value of $'k'$, $-1$ is one of the zeroes of the quadratic polynomial $(k-2)x^2 - 2x - 5$<br><div align="center">**OR**</div> | **2** |
| **(B)** | If $\alpha$ & $\beta$ are the zeroes of the polynomial $f(x) = x^2 - 7x + 12$, then find the value of $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$ | **2** |
| **38.** | A toy rocket is in the form of a right circular cylinder closed at the lower end and surmounted by cone with same radius as that of cylinder. The height & diameter of the cylindrical part is 12 cm & 6 cm, respectively. Given slant height of the conical part is 5 cm ($\pi = 3.14$)<br><br>Based on the above information answer the following questions: | |
| **(i)** | Find the height of the cone. | **1** |
| **(ii)** | Find curved surface area of the cylindrical part. | **1** |
| **(iii)(A)** | Determine the total surface area of the toy<br><div align="center">**OR**</div> | **2** |
| **(B)** | Determine the volume of the toy. | **2** |