RASHTRIYA MILITARY SCHOOL BENGALURU Practice Paper 5 Examination - 2023-24

Class- X Time Allowed: 3 Hours General Instructions :

- 1. This Question Paper has 5 Sections A-E.
- 2. Section A has 20 MCQs carrying 1 mark each
- 3. Section B has 5 questions carrying 02 marks each.
- 4. Section C has 6 questions carrying 03 marks each.
- 5. Section D has 4 questions carrying 05 marks each.
- 6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts.
- 7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided.
- 8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

Section - A

Section A consists of 20 questions of 1 mark each.

1.	If α a	and β are the zeroes of the polynomial $x^2 + 2x + 1$, the	hen $\frac{1}{\alpha} + \frac{1}{\beta}$ is equal to
	(a)	-2	(b) 2
	(c)	0	(d) 1

2.	The roots of the quadratic equation $x^2 - 0.04 = 0$ are	
	(a) ± 0.2	(b) ± 0.02

- (c) 0.4 (d) 2
- 3. In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle POB = 115^{\circ}$, then perimeter of $\angle APO$ is



- (a) 25° (b) 20°
- (c) 30° (d) 65°

(c) 20 (d) 28

Maximum Marks: 80

^{4.} In an AP, if d = -4, n = 7 and $a_n = 4$, then a is equal to (a) 6 (b) 7

5. A bag contains 3 red and 2 blue marbles. If a marble is drawn at random, then the probability of drawing a blue marble is:

(a)	$\frac{2}{5}$	(b) $\frac{1}{4}$
(c)	$\frac{3}{5}$	(d) $\frac{2}{3}$

225 can be expressed as	
(a) 5×3^2	(b) $5^2 \times 3$
$({\rm c}) ~~5^2 \times 3^2$	(d) $5^3 imes 3$

7. In Figure, $DE \mid \mid BC$. Find the length of side AD, given that AE = 1.8 cm, BD = 7.2 cm and CE = 5.4 cm.

(b) 4

B C E C			
2.4 cm (b) 2.2 cm	(a)	2.4 cm	
3.2 cm (d) 3.4 cm	(c)	3.2 cm	

8. Consider the following distribution :

Marks obtained	Number of students
More than or equal to 0	63
More than or equal to 10	58
More than or equal to 20	55
More than or equal to 30	51
More than or equal to 40	48
More than or equal to 50	42

the frequency of the class 30-40 is :

(a)
$$3$$

9. If $\cos 9\alpha = \sin \alpha$ and $9\alpha < 90^{\circ}$, then the value oftan 5α is

(a)
$$\frac{1}{\sqrt{3}}$$
 (b) $\sqrt{3}$

(c)
$$1$$
 (d) 0

6.

From the top of a 7 m high building the angle of elevation of the top of a cable tower is 60° and the angle of 10. depression of its foot is 45° , then the height of the tower is (b) 17.124 m (a)14.124 m

(c) $19.124~\mathrm{m}$ (d) 15.124 m

11. A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. If the angle made by the rope with the ground level is 30° , then what is the height of pole?

- (b) 8 m (a)20 m(c) (d) 6 m $10 \mathrm{m}$
- 12. The maximum number of zeroes a cubic polynomial can have, is (a)1 (b) 4 (d) 3 (c) 2

If triangle ABC is similar to triangle DEF such that 2AB = DE and BC = 8 cm then find EF. 13.

- (a)16 cm(b) 14 cm (d) 15 cm
- (c) 12 cm

14. A sphere is melted and half of the melted liquid is used to form 11 identical cubes, whereas the remaining half is used to form 7 identical smaller spheres. The ratio of the side of the cube to the radius of the new small sphere is $\left(\frac{4}{3}\right)^{1/3}$ (b) $\left(\frac{8}{3}\right)^{1/3}$ (a)

- $(3)^{1/3}$ (d) 2 (c)
- Ratio of volumes of two cones with same radii is 15. (b) $s_1: s_2$ (a) $h_1: h_2$ (c) (d) None of these $r_1: r_2$

In the formula $\overline{x} = a + h\left(\frac{\sum f_i u_i}{\sum f_i}\right)$, for finding the mean of grouped frequency distribution, u_i is equal to 16.

 $\frac{x_i+a}{h}$ (b) $h(x_i - a)$ (a) (d) $\frac{a-x_i}{h}$ $\frac{x_i - a}{h}$ (c)

17. If the probability of an event is p, then the probability of its complementary event will be (a)p-1(b) *p*

(d) $1 - \frac{1}{p}$ 1 - p(c)

18. The distance of the point P(-3, -4) from the x-axis (in units) is (a)(b) -33

(d) 5 (c) 4

In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correction option.

- 19. Assertion: Pair of linear equations : 9x + 3y + 12 = 0, 8x + 6y + 24 = 0 have infinitely many solutions. Reason: Pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have infinitely many solutions, if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
 - (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 - (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
 - (c) Assertion (A) is true but reason (R) is false.
 - (d) Assertion (A) is false but reason (R) is true.

20. Assertion : If the circumference of a circle is 176 cm, then its radius is 28 cm.

- **Reason :** Circumference $= 2\pi \times \text{radius}$
- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

Section - B

Section B consists of 5 questions of 2 marks each.

21. In the given figure, if *ABCD* is a trapezium in which AB || CD || EF, then prove that $\frac{AE}{ED} = \frac{BF}{FC}$



22. In the given figure, from a point P, two tangents PT and PS are drawn to a circle with centre O such that $\angle SPT = 120^{\circ}$, Prove that OP = 2PS.



- **23.** If $\sqrt{3}\sin\theta \cos\theta = 0$ and $0^{\circ} < \theta < 90^{\circ}$, find the value of θ .
- 24. A box contains cards numbered 11 to 123. A card is drawn at random from the box. Find the probability that the number of the drawn card is
 - (i) A perfect square number
 - (ii) A multiple of 7.

OR

A letter of English alphabet is chosen at random, find the probability that the letter so chosen is :

- (i) a vowel,
- (ii) a consonant.

25. In Figure $\angle D = \angle E$ and $\frac{AD}{DB} = \frac{AE}{EC}$, prove that $\triangle BAC$ is an isosceles triangle.





ABC is a right triangle right angled at C. Let BC = a, CA = b, AB = c PQR, $ST \mid |QR$ and p be the length of perpendicular from C to AB. Prove that cp = ab.



Section C consists of 6 questions of 3 marks each.

- 26. Quadratic polynomial $2x^2 3x + 1$ has zeroes as α and β . Now form a quadratic polynomial whose zeroes are 3α and 3β .
- 27. Find whether the following pair of linear equations has a unique solutions. If yes, find the solution : 7x - 4y = 49, 5x - 6y = 57.

28. In given figure $\triangle ABC \sim \triangle DEF$. AP bisects $\angle CAB$ and DQ bisects $\angle FDE$.



OR

A

F

E

C

D

Prove that :

(1)
$$\frac{AP}{DQ} = \frac{AB}{DE}$$

(2) $\Delta CAP \sim \Delta FDQ.$

In the given figure, $DE \mid \mid AC$ and $DF \mid \mid AE$. Prove that $\frac{BE}{FE} = \frac{BE}{EC}$.

B



30. A conical vessel, with base radius 5 cm height 24 cm, is full of water. This water emptied into a cylindrical vessel, of base radius 10 cm. Find the height to which the water will rise in the cylindrical vessel. Use $\pi = \frac{22}{7}$

OR

504 cones, each of diameter 3.5 cm and height 3 cm, are melted and recast into a metallic sphere. Find the diameter of the sphere and hence find its surface area. Use $\pi = \frac{22}{7}$

31. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together?

Section - D

Section D consists of 4 questions of 5 marks each.

32. Find for $x: \frac{1}{x-2} + \frac{2}{x-1} = \frac{6}{x}$; $x \neq 0, 1, 2$

OR

Find the values of k for which the equation $(3k+1)x^2 + 2(k+1)x + 1$ has equal roots. Also find the roots.

33. In figure O is the centre of a circle of radius 5 cm. T is a point such that OT = 13 cm and OT intersects circle at E. If AB is a tangent to the circle at E, find the length of AB, where TP and TQ are two tangents to the circle.



34. Find the mode of the following frequency distribution

Class Interval	25-30	30-35	35-40	40-45	45-50	50-55
Frequency	25	34	50	42	38	14

OR

On the sports day of a school, 300 students participated. Their ages are given in the following distribution :

Age (in years)	5-7	7-9	9-11	11-13	13-15	15-17	17-19
Number of students	67	33	41	95	36	13	15

Find the mean and mode of the data.

35. Find the ratio in which the line x - 3y = 0 divides the line segment joining the points (-2, -5) and (6, 3). Find the coordinates of the point of intersection.

Section - E

Case study based questions are compulsory.

- **36.** Volume of a Bird Cage. A company makes rectangular shaped bird cages with height b inches and square bottoms. The volume of these cages is given by the function $V = b^3 - 6b^2 + 9b$.
 - (i) Find an expression for the length of each side of the square bottom.
 - (ii) Use the function to find the volume of a cage with a height of 18 inches.
 - (iii) Use the remainder theorem to find the volume of a cage with a height of 15 inches.
 - (iv) Verify the result of (iii) using function ?

Page 7



37. Dipesh bought 3 notebooks and 2 pens for Rs. 80. His friend Ramesh said that price of each notebook could be Rs. 25. Then three notebooks would cost Rs.75, the two pens would cost Rs. 5 and each pen could be for Rs. 2.50. Another friend Amar felt that Rs. 2.50 for one pen was too little. It should be at least Rs. 16. Then the price of each notebook would also be Rs.16.



Aditya also bought the same types of notebooks and pens as Dipesh. He paid 110 for 4 notebooks and 3 pens.

- (i) Whether the estimation of Ramesh and Amar is applicable for Aditya?
- (ii) Let the cost of one notebook be x and that of pen be y. Which of the following set describe the given problem ?
- (iii) What is the exact cost of the notebook?
- (iv) What is the exact cost of the pen? What is the total cost if they purchase the same type of 15 notebooks and 12 pens.

38. Conical Tank : The advantages of cone bottom tanks are found in nearly every industry, especially where getting every last drop from the tank is important. This type of tank has excellent geometry for draining, especially with high solids content slurries as these cone tanks provide a better full-drain solution. The conical tank eliminates many of the problems that flat base tanks have as the base of the tank is sloped towards the centre giving the greatest possible full-drain system in vertical tank design.



Rajesh has been given the task of designing a conical bottom tank for his client. Height of conical part is equal to its radius. Length of cylindrical part is the 3 times of its radius. Tank is closed from top. The cross section of conical tank is given below.



- (i) If radius of cylindrical part is taken as 3 meter, what is the volume of above conical tank ?
- (ii) What is the area of metal sheet used to make this conical tank ? Assume that tank is covered from top.
- (iii) What is the ratio of volume of cylindrical part to the volume of conical part?
- (iv) The cost of metal sheet is Rs 2000 per square meter and fabrication cost is 1000 per square meter. What is the total cost of tank ?

Page 9