MATHEMATICS (Compulsory) English Version

1. Choose the correct option in each case from the following questions: 1x6=6

(i) Interest on Rs. *a* at the simple interest 10% per annum for *b* months is

(a) Rs.$\frac{ab}{100}$ ab100 (b) Rs.$\frac{ab}{120}$ ab120 (c) Rs.$\frac{ab}{1200}$ ab1200 (d) Rs. $\frac{ab}{10}$ ab10

(ii) If x a y xay, then—

(a) x^2 a y^3 x2ay3 (b) x^3 a y^2 x3ay2 (c) x a y^2 xay2 (d) x^2 a y^2 x2ay2

(iii) If ∠A∠A = 100° of a cyclic quadrilateral ABCD, then the value of ∠C ∠C is—

(a) 50° (b) 200° (c) 80° (d) 180°

(iv) The sexagesimal value of $\frac{7\pi}{12}$ 7π12 is—

(a) 115° (b) 150° (c) 135° (d) 105°

(v) If side of a cube is a unit and the diagonal of the cube is *d* unit then the relation between *a* and *d* will be—

(a) $\sqrt{2a-d}$ 2a−d (b) $\sqrt{3a-d}$ 3a−d (c) $a=\sqrt{3d}$ a=3d (d) $a=\sqrt{2d}$ a=2d

(vi) If the mean of the numbers 6, 7. x, 8, y. 16 is 9 then—

(a) x + y = 21 (b) x + y = 17 (c) x - y = 21 (d) x - y = 19

2. Fill in the blanks (any five): 1x5=5

(i) If the simple interest of a principal for *n* years at r % p.a. be Rs. $\frac{pnr}{25}$ pnr25, then the principal will be Rs.—

(ii) The equation (a - 2)x^2 + 3x + 5 = 0 will not be a quadratic equation for a = ——

(iii) If ABCD is a cyclic parallelogram then ∠A∠A is ——

(iv) If tan 35° tan 55° = sin θ, then the lowest positive value of θ will be ——

(v) The shape of a pencil with one end sharpened is the combination of a cylinder and a ——

(vi) The measures of central tendency are Mean, Median and ——

3. Write True or False (any five): 1x5=5

(i) At same rate of interest the simple interest for 2 years is more than the compound interest on the same principal.

(ii) x^3y, x^2y^2 and xy^3 are in continued proportion.

(iii) The angle in the segment of a circle which is less than a semi circle is an obtuse angle.

(iv) Simplest value of $\sec^2 27° - \cot^2 63°$ is 1.

(v) If the radius of a sphere is twice that of 1st sphere then the volume of the sphere will be twice that of the 1st sphere.

(vi)(vi)

Score	1	2	3	4	5
No. of Students	12	15	20	18	15

The mode of the distribution is 3.

4. Answer the following questions (any ten): 2x10=20

(i) The rate of simple interest per annum reduces from 4% to $3\frac{3}{4}$ 334% for this,

a person's annual income decreases by Rs. 60. Determine the principal of that person.

(ii) A and B start a business with Rs.15,000 and Rs.45,000 respectively.

After 6 months B received Rs. 3,030 as profit. What is A's profit ?

(iii) If $2x + \frac{1}{x} = 2$ 2x+1x=2, then find the value of$\frac{x}{2x^2+x+1}$x2x2+x+1.

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(iv) If the roots of a quadratic equation be 2 and -3, then write the equation.

(v) The line parallel to BC of Δ ABC meets AB and AC at P and Q respectively.

If AP = 4 cm, QC = 9 cm and PB = AQ, then find the length of PB.

(vi) The radius of a circle with centre O is 5 cm. P is a point at a distance 13 cm from O. PQ and PR are two tangents to this circle. Find the area of the quadrilateral PQOR.

(vii) The two chords AB and CD. of a circle are at equal distance from the centre O. If $\angle AOB$ ∠AOB = 60° and CD = 6 cm, then calculate the length of the radius of the circle.

(viii) If tan θ + cot θ = 2 then, find the value of $\tan^7 \theta + \cot^7 \theta$.

(ix) If the ratio of length of shadow of a tower and height of the tower is $\sqrt{3} : 13$:1, find the value of elevation of the Sun.

(x) The volumes of two right circular cylinders are same. The ratio of their height is 1 : 2. Find the ratio of their radii.

(xi) The volume of a solid hemisphere is 144π cu. cm, then find the diameter of the sphere.

(xii) The mean of a frequency distribution is 8.1, if $\sum f_1 x_1 = 132 + 5K$ ∑f1x1=132+5K and $\sum f_1 = 20$ ∑f1=20 then what is the value of *K* ?

5. Answer any one question: 5x1=5

(i) Aminur has taken a loan of Rs. 64,000 from a bank. If the rate of interest be 2.5 paise per rupee per annum, calculate the compound interest payable after 2 years,

(ii) A, B and C start a business with the capital of Rs. 6,000, Rs. 8,000 and Rs. 9,000 respectively. After few months A invests Rs. 3,000 more in the business. At the end of the year they gained Rs.30,000 and C got Rs.10,800 as share of profit. When did A invest Rs. 3,000 more ?

6. Solve any one question: 3x1=3

(i) Solve : $\left(\frac{x+4}{x-4}\right)^2 - 5\left(\frac{x+4}{x-4}\right) + 6 = 0 \, (x \neq 4)$ (x+4x−4)2−5(x+4x−4)+6=0(x≠4)

(ii) The digit in the unit's place of a two digited number is 6 more than that at the ten's place. The product of the digits is 12 less than the number. Find the possible values of the digit in the unit place.

7. Answer any one question: 3x1=3

(i) Find the simplest value of : $\sqrt{7}(\sqrt{5} - \sqrt{2}) - \sqrt{5}(\sqrt{7} - \sqrt{2}) + \frac{2\sqrt{2}}{\sqrt{5}+\sqrt{7}}$ 7(5−2)−5(7−2)+225+7

(ii) If $x \text{ a } y$ xay and $y \text{ a } z$yaz, then prove that: $(x^2 + y^2 + z^2) \text{ a } (xy + yz + zx)$ (x2+y2+z2)a(xy+yz+zx).

8. Answer any one question: 3x1=3

(i) If $\frac{a+b-c}{a+b} = \frac{b+c-a}{b+c} = \frac{c+a-b}{c+a}$ a+b−ca+b=b+c−ab+c=c+a−bc+a and a + b + c ≠ 0, then prove that a = b = c

(ii) If x : a = y : b = z : c, then show that, $(a^2 + b^2 + c^2)(x^2 + y^2 + z^2) = (ax + by + cz)^2$.

9. Answer any one question: 5x1=5

(i) Prove that, if a perpendicular is drawn on the hypotenuse from the right angular point of a right angled triangle, two triangles so formed on the two sides of the perpendicular are each similar to the original triangle and also similar to each other,

(ii) Prove that the tangent and the radius through the point of contact of a circle are perpendicular to each other.

10. Answer any one question: 3x1=3

(i) In $\triangle ABC$ △ABC, AD is perpendicular on BC and $AD^2 = BD \cdot DC$ AD2=BD·DC. Prove that, $\angle BAC$ ∠BAC is a right angle,

(ii) A straight line intersects one of the two concentric circles at the points A and B and other at the points C and

D. Prove that AC = BD.

11. Answer any one question: 5x1=5

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(i) Construct two circles of radii 4 cm and 2 cm and the distance between their centres is 7 cm. Construct a direct common tangent of the circles. (Only traces of construction are required),

(ii) Construct a triangle whose two sides are 9 cm and 7 cm and the angle between them is 60°. Construct the incircle of the triangle. (Only traces of construction are required).

12. Answer any two questions: 3x2=6

(i) An arc of length 220 cm of a circle makes and angle 60° at the centre. Find the radius of the circle.

(ii) If $\cos^2\theta - \sin^2\theta = \frac{1}{2}12$, then find the value of $\tan^2\theta$.

(iii) Find the value of : $\frac{\sec 17^\circ}{\text{cosec}17^\circ} + \frac{\tan 68^\circ}{\cot 22^\circ} + \cos^2 44^\circ \cos^2 46^\circ$ sec17∘cosec17∘+tan68∘cot22∘+cos244∘cos246∘

13. Answer any one question: 5x1=5

(i) The length of the shadow of a post becomes 3 metres smaller when the angle of elevation of the Sun increases from 45° to 60°. Find the height of the post,

(ii) A man standing on a railway bridge $5\sqrt{3}53$ metres high, observes the engine of a train at an angle of depression 30°. But after 2 seconds, he observes the engine at an angle of depression 45° on the other side of the bridge. Find the speed of the train.

14. Answer any two questions: 4x2=8

(i) Each side of a cube is decreased by 50%. Calculate the ratio of the volumes of original and changed cube.

(ii) The total surface area of a right circular cylindrical pot without lid be 2002 sq. cm. If the radius of the base be 7 cm. Find the quantity of water in litres contained in the pot. (1 litre = 1 cu. dm.)

(iii) A tank of length 21 dcm, breadth 11 dcm and 6 dcm deep is half filled with water. If 100 solid iron balls of diameter 21 cm are completely immersed in the tank, then how much dcm of water level is raised ?

15. Answer any two questions: 4x2=8

(i) Find the mode from the following frequency distribution table of ages of examinees of an entrance examination.

Age (in year)	16-18	18-20	20-22	22-24	24-26
No. of examinees	45	75	38	22	20

(ii) Find the median of given data:

Class interval	1-5	6-10	11-15	16-20	21-25	26-30	31-35
Frequency	2	3	6	7	5	4	3

(iii) From the frequency distribution table given below, draw a less than ogive.

Marks Obtained	50-60	60-70	70-80	80-90	90-100
Frequency	4	8	12	6	10

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