Experts' Institute
8-D, Kutchery Road Prayagraj. Ph:9415368884

JAVA Comp. Applications

Python Robotics & AI

ST. JOSEPH'S COLLEGE, PRAYAGRAJ
HALF YEARLY EXAMINATION 2024
MATHEMATICS

TIME: 3 Hours

CLASS – IX

MM: 80

Answers to this Paper must be written on the paper provided separately. You will not be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper. The time given at the head of this Paper is the time allowed for writing the answers.

Attempt **all** questions from **Section A** and **any four** questions from **Section B**. *All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.* **Omission of essential working will result in loss of marks.** The intended marks for questions or parts of questions are given in brackets [ ]
Mathematical tables are not provided.

SECTION-A
(Attempt all questions from this Section)

Question 1. Choose the correct answers to the questions from the given options.   [15]
    (Do not copy the questions, write the correct answer only)

1) Rationalising factor of $3\sqrt{2}$ is

    a. $\sqrt{2}$ *b.* $\sqrt{3}$ *c.* $3\sqrt{3}$ *d.* none of these

2) If x + y = 16 and x- y= 2 then value of xy is-
    a.   60   b. 163   c. -63   d. none of these

3) a^4-b^4 in factor form is
    a.   (a+b) (a+b) (a-b)   b. (a+b) (a-b) (a^2-b^2)
    c.   (a+b) (a-b) (a^2+b^2) d. none of these.

4) $3^0 + 3^{-1} + 3^{-2}$ is equal to

    a. $\dfrac{11}{9}$ *b.* $\dfrac{13}{9}$ *c.* $\dfrac{10}{9}$ *d.* none of these

5) If $\log_{\sqrt{3}} 27 = x$, then the value of x is-
    a.   3   b. 4   c.6   d. 9

6) In $\triangle$ ABC, $\angle$ C=90⁰, $\triangle$ ABC is a/an
    a. obtuse angle   b. right-angled triangle
    c. acute angled triangle   d. none of these

7) If $\triangle$ ABC $\cong$ $\triangle$ PQR, AB= PQ, BC= QR and $\angle$B=$\angle$Q, then condition of congruency is-
    a.   SAS   b. RHS   c. AAS   d. none of these

8) ABC is a right angled triangle where hypotenuse is AC. If AB : BC = 3: 4 then the smallest angle is –
    a. $\angle$B   b. $\angle$A   c. $\angle$C   d. none of these

9) If $2\sin 2\theta = \sqrt{3}$ and $0° < \theta < 90°$, then θ is equal to
    a.   20°   c.   15°   e. None of these
    b.   30°   d.   60°

10) If sin A = cos B, find the value of A + B is
    a.   30°   c.   60°   e. None of these
    b.   45°   d.   90°

11) A ladder 17m long reaches a window above the ground. If the distance of the foot of the ladder from wall is 8m, the height of the window is

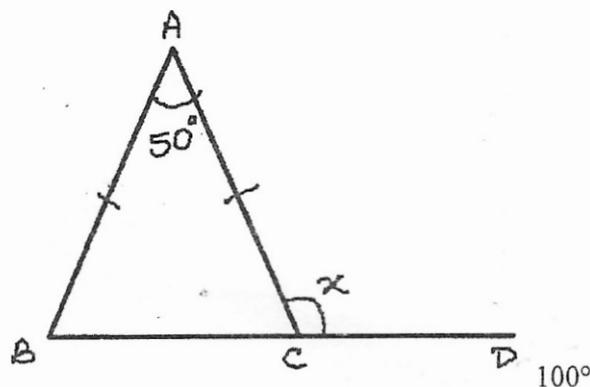   a) 12m   b) 13m   c) 14m   d) 15m   e) None of these

12) In $\triangle ABC$, the correct relation is
   a. $AB - BC > CA$
   b. $BC - CA > AB$
   c. $AB + BC < AC$
   d. • $AB < BC + AC$
   e. None of these

13) The rate of interest at which the sum of money ₹2000 yields ₹420 as compound interest compounded annually in 2 years is
   a. 8%
   b. • 10%
   c. 11%
   d. 12%
   e. None of these

14) In the adjoining figure, the value of x is

   a. 105°
   b. • 115°
   c. 130°
   d. None of these

15) In a $\triangle PQR$ if PQ = 18cm, QR = 12cm and PR = 8cm. S and T are the midpoints of the sides QR and PR respectively. The length of the line segment ST is

   a. 6cm   b. 4cm   c. 12cm   • d. 9cm   e. None of these

Question 2.

a. The cost of a machine is supposed to depreciate each year at 8% of its value at the beginning of the year. If the cost of machine is ₹40000 at the beginning of 2004, find its value   [4]
   i.   At the end of 2005
   ii. At the beginning of 2003.

b. Find the value of -   [4]

   $(\cos 0^0 + \sin 45^0 + \sin 30^0)(\sin 90^0 - \cos 45^0 + \cos 60^0)$

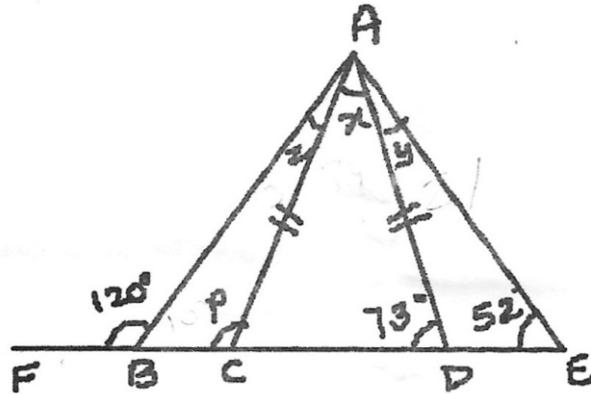c. If $x = \dfrac{1}{4-x}$, find the values of   [4]

 $(a)\quad x + \dfrac{1}{x} \qquad (b)\ x^3 + \dfrac{1}{x^3} \qquad (c)\quad x^6 + \dfrac{1}{x^6}$

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Question 3.

a. In the figure given below, $\angle FBA = 120°$, $\angle ADC = 73°$ and $\angle AED = 52°$ calculate the measure of each of the angles x, y, z and p [4]

b. If p and q are rational number and $p - \sqrt{15}q = \frac{2\sqrt{3}-\sqrt{5}}{4\sqrt{3}-3\sqrt{5}}$, find the values of p and q. [4]

c. In the figure given, line segment AB is parallel to another line segment CD. O is the midpoint of AD, show that. [5]
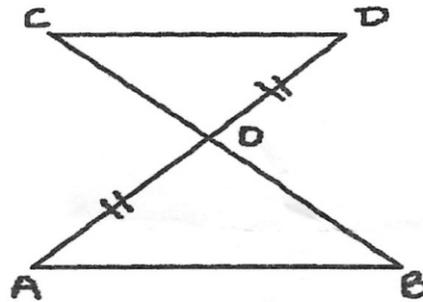
   i. $\triangle AOB \cong \triangle DOC$

   ii. O is also the midpoint of BC

SECTION-B
(Attempt **any four** questions from this section)

Question 4.

a. Solve for x : $2^3\left(5^0 + 3^{2x}\right) = 8\dfrac{8}{27}$ [3]

b. log (x+1) + log (x-1) = log 11+ 2 log 3
find x. [3]

c. Prove that $\sqrt{2}$ is an irrational number. [4]

Question 5.

a. Solve : $4x^2 -2x+ \dfrac{1}{4} =0$ [3]

b. Factorise : $9x^2-4 (y + 2x)^2$ [3]

c. If $4 \cot \theta = 4$, find the value of $\dfrac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta}$ [4]

Question 6.

a. In a $\triangle$ ABC, $\angle A= 50^0$, $\angle B= 60^0$. Arrange the sides of the triangle in ascending order. [3]

b. Express $0.1\overline{34}$ in the form $\dfrac{p}{q}$, where p and q are both integers and $q \neq 0$ [3]

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c. If $a = \dfrac{1}{a-5}$, find [4]

(a) $a - \dfrac{1}{a}$ (b) $a + \dfrac{1}{a}$ (c) $a^2 - \dfrac{1}{a^2}$

Question 7.

a. Simplify- [5]

$$\frac{(32)^{\frac{2}{5}} \times (4)^{\frac{-1}{2}} \times (8)^{\frac{1}{3}}}{2^{-2} \div (64)^{\frac{-1}{3}}}$$

b. Prove that- [5]
The line segment joining the mid-points of any two sides of a triangle is parallel to the third side and is equal to half of it.

Question 8.

a. If $x + y + z = 0$, find the value of $\dfrac{(x+y)^2}{xy} + \dfrac{(y+z)^2}{yz} + \dfrac{(z+x)^2}{zx}$ [3]

b. Evaluate the following without using tables [3]

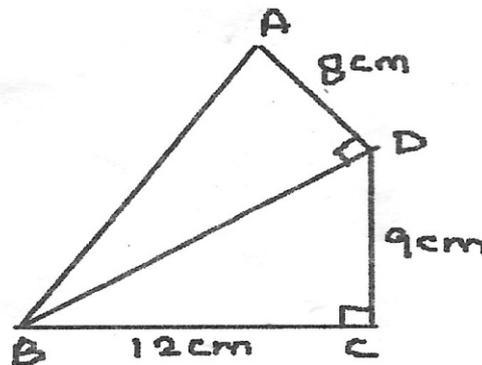$$3 \tan 28° \tan 62° - \frac{\sec 36°}{cosec\ 54°} + \frac{\sin 28°}{\cos 62°}$$

c. Find the value of the following [4]

$$\left(4 \sin 60° + \frac{\cos 60°}{\sin 30°}\right)(4 \cos 30° - 2 \sin 30°)$$

Question 9.

a. Factorise: $x^4 + x^3 + 8x + 8$ [3]
b. In the figure given below, find the length of the sides AB and AD. [3]

c. If $\sin A = \dfrac{3}{5}$ and $\cos B = \dfrac{12}{13}$, evaluate [4]
 i. $sec^2 A$
 ii. $\tan A + \tan B$

Question 10.

a. What sum will amount to Rs.28090 in two years at 6% per annum compound interest? Also find the compound interest [3]
b. Factorise- [3]

$$8x^3 - \frac{1}{27y^3}$$

c. Find the value of: [4]

$$\frac{\cot 35°}{\tan 55°} - \frac{1}{2}\left(\frac{\sec 25°}{cosec\ 65°}\right) + 3 \sin 31° \sec 59°$$