

PART—II
(MATHEMATICS)

- 41.** During conversion of a solid from one shape to another, the volume of the solid will
- (A) decrease
(B) remain unaltered
(C) increase
(D) More than one of the above
(E) None of the above
- 42.** The Cartesian coordinates of three points A , B and C are $(1, -1)$, $(3, -4)$ and $(5, -7)$ respectively. Then the ΔABC is
- (A) isosceles
(B) equilateral
(C) right-angled
(D) More than one of the above
(E) None of the above
- 43.** A sweet seller has 420 Kaju Burfis and 150 Badam Burfis. He wants to stack them in such a way that each stack has the same number, and they take up the least area of the tray. The number of such stacks formed is
- (A) 17
(B) 19
(C) 18
(D) More than one of the above
(E) None of the above
- 44.** Let $x + 2y + 4 = 0$ and $-4x + 2y - 3 = 0$ be the equations of two straight lines. Then
- (A) they are parallel
(B) both are passing through the origin
(C) one is passing through the origin
(D) More than one of the above
(E) None of the above
- 45.** Pritam and Rana drive around a circular sports field. Pritam takes 16 minutes to take one round while Rana completes the round in 20 minutes. If both start from the same point, at the same time and in the same direction, after how much time will they meet at the starting point?
- (A) 80 minutes
(B) 32 minutes
(C) 40 minutes
(D) More than one of the above
(E) None of the above



- 46.** The largest number that divides 450, 577 and 704, leaving remainders 9, 10 and 11 respectively, is
- (A) 63
(B) 577
(C) 450
(D) More than one of the above
(E) None of the above
- 47.** If α, β, γ are the zeros of the polynomial $x^3 - 6x^2 - x + 30$, then the value of $\alpha\beta + \beta\gamma + \gamma\alpha$ is
- (A) 1
(B) -1
(C) 6
(D) More than one of the above
(E) None of the above
- 48.** If $\sin \theta = \frac{m}{n}$, then the value of $\frac{\tan \theta + 4}{4 \cot \theta + 1}$ is
- (A) $\frac{m}{\sqrt{n^2 - m}}$
(B) $\frac{n}{\sqrt{n^2 - m}}$
(C) $\frac{m}{\sqrt{m^2 - n^2}}$
(D) More than one of the above
(E) None of the above
- 49.** If the n th term of an arithmetic progression is $(2n + 1)$, then the sum of its first three terms is
- (A) $6n + 3$
(B) 15
(C) 12
(D) More than one of the above
(E) None of the above
- 50.** $\triangle ABC$ and $\triangle DBC$ are on the same base BC and on the opposite sides of BC . If O is the intersection point of the diagonals AD and BC , then
- $$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DBC}$$
- is equal to
- (A) $\frac{BO}{CO}$
(B) $\frac{AO}{DO}$
(C) $\frac{AO}{CO}$
(D) More than one of the above
(E) None of the above



51. Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars?

- (A) 60 km/hr, 40 km/hr
- (B) 30 km/hr, 70 km/hr
- (C) 20 km/hr, 80 km/hr
- (D) More than one of the above
- (E) None of the above

52. The sum of the squares of two positive integers is 306. If the square of the larger integer is 25 times the smaller integer, then the difference between the two integers is

- (A) 6
- (B) 10
- (C) 1
- (D) More than one of the above
- (E) None of the above

53. Consider the following frequency distribution :

<i>Class</i>	<i>Frequency</i>
0–10	3
10–20	9
20–30	15
30–40	30
40–50	18
50–60	5

The modal class is

- (A) 20–30
- (B) 30–40
- (C) 40–50
- (D) More than one of the above
- (E) None of the above

54. If two diagonals AC and DB of a quadrilateral $ABCD$ intersect at a point E such that

$$AE : EC :: 1 : 2 \text{ and } BE : ED :: 3 : 6$$

then $ABCD$ is

- (A) an arbitrary quadrilateral
- (B) a rhombus
- (C) a parallelogram
- (D) More than one of the above
- (E) None of the above

- 55.** Find the two numbers such that the sum of thrice the first and the second is 142, and four times the first exceeds the second by 138.
- (A) 42, 20
(B) 32, 40
(C) 40, 22
(D) More than one of the above
(E) None of the above
- 56.** If the slope of the line joining the points $(k, 4)$ and $(-3, -2)$ is $\frac{1}{2}$, then the value of k is
- (A) 3
(B) -9
(C) 9
(D) More than one of the above
(E) None of the above
- 57.** A person on tour has ₹ 4,200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by ₹ 70. The original duration of the tour will be
- (A) 14 days
(B) 12 days
(C) 16 days
(D) More than one of the above
(E) None of the above
- 58.** A motorboat, whose speed is 18 km/hr in still water, takes one hour more to go 24 km upstream than to return downstream to the same spot. The speed of the stream is
- (A) -54 km/hr
(B) 6 km/hr
(C) 10 km/hr
(D) More than one of the above
(E) None of the above
- 59.** Find the centre of a circle passing through the points $(6, -6)$, $(3, -7)$ and $(3, 3)$.
- (A) $(3, 3)$
(B) $(3, -2)$
(C) $(2, -3)$
(D) More than one of the above
(E) None of the above



- 60.** Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. The time (in hours) in which each tap can separately fill the tank is respectively
- (A) 10, 20
(B) 15, 25
(C) 5, 15
(D) More than one of the above
(E) None of the above
- 61.** In a class test, the sum of Kamal's marks in Mathematics and English is 40. Had he got 3 marks more in Mathematics and 4 marks less in English, the product of the marks would have been 360. The marks obtained by Kamal in two subjects separately are
- (A) 21, 19
(B) 12, 28
(C) 21, 12
(D) More than one of the above
(E) None of the above
- 62.** A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. The probability that none of the balls drawn is blue is
- (A) $\frac{10}{21}$
(B) $\frac{11}{21}$
(C) $\frac{2}{7}$
(D) More than one of the above
(E) None of the above
- 63.** A man saved ₹33,000 in 10 months. In each month after the first, he saved ₹100 more than he did in the preceding month. How much did he save in the first month?
- (A) ₹2,850
(B) ₹1,850
(C) ₹1,900
(D) More than one of the above
(E) None of the above



64. The area of a square field is 24200 square metres. At the rate of 6.6 km/hr, how much time will a lady take to cross the field diagonally?

- (A) 3 minutes
- (B) 2 minutes
- (C) 2.4 minutes
- (D) More than one of the above
- (E) None of the above

65. The sum of all three-digit natural numbers, multiple of 11, is

- (A) 44540
- (B) 44550
- (C) 54540
- (D) More than one of the above
- (E) None of the above

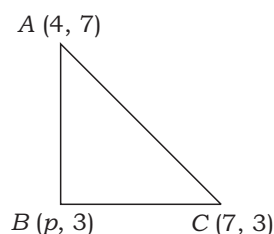
66. For what value of k , the equations

$$\begin{aligned} 3(k-1)x + 4y &= 24 \\ 15x + 20y &= 8(k+13) \end{aligned}$$

have infinitely many solutions?

- (A) 2
- (B) -2
- (C) 3
- (D) More than one of the above
- (E) None of the above

67. The value of p such that the points $A(4, 7)$, $B(p, 3)$, $C(7, 3)$ are the vertices of a right-angled triangle, having right angle at B , is



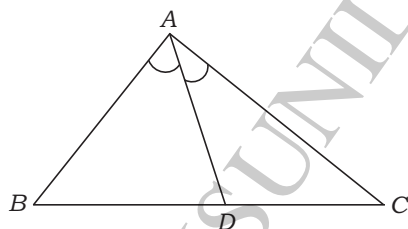
- (A) 3
- (B) 5
- (C) 4
- (D) More than one of the above
- (E) None of the above



68. A 5 cm cube is cut into as many 1 cm cubes as possible. The ratio of the surface area of the larger cube to that of the sum of the surface areas of the smaller cubes is

- (A) 1 : 6
 (B) 1 : 5
 (C) 1 : 25
 (D) More than one of the above
 (E) None of the above

69. In a $\triangle ABC$, AD is the bisector of $\angle A$. If $AB = 6.4$ cm, $AC = 8$ cm and $BD = 5.6$ cm, then the value of DC is



- (A) 7 cm
 (B) 9 cm
 (C) 12 cm
 (D) More than one of the above
 (E) None of the above

70. The sum of LCM and HCF of two numbers is 1260. If their LCM is 900 more than their HCF, then the product of the two numbers is

- (A) 203400
 (B) 194400
 (C) 198400
 (D) More than one of the above
 (E) None of the above

71. If the bisector of an angle of a triangle bisects the opposite side, then the triangle is

- (A) equilateral
 (B) right-angled
 (C) isosceles
 (D) More than one of the above
 (E) None of the above

72. The angles of elevation of the top of a tower from two points at distances of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary. Then the height of the tower is

- (A) 6 m
 (B) 10 m
 (C) 9 m
 (D) More than one of the above
 (E) None of the above

- 73.** The area of a rhombus is 480 cm^2 and the length of one of its diagonals is 20 cm. The length of each side of the rhombus is
- (A) 24 cm
(B) 30 cm
(C) 26 cm
(D) More than one of the above
(E) None of the above
- 74.** The factors of $2a^7 - 128a$ are
- (A) $a(a+2)^3(a-2)^3$
(B) $2a(a+2)(a-2)(a^2+2a-4)$
 (a^2-2a-4)
(C) $2a(a+2)(a-2)(a^2+2a+4)$
 (a^2-2a+4)
(D) More than one of the above
(E) None of the above
- 75.** Which of the following pairs of lines in a circle **cannot** be parallel?
- (A) Two chords
(B) A chord and a tangent
(C) Two diameters
(D) More than one of the above
(E) None of the above
- 76.** A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is four times that of a red ball, then the number of blue balls in the bag is
- (A) 10
(B) 40
(C) 20
(D) More than one of the above
(E) None of the above
- 77.** If $\sin A + \sin^2 A = 1$, then $\cos^2 A + \cos^4 A = ?$
- (A) 2
(B) 1
(C) -1
(D) More than one of the above
(E) None of the above
- 78.** The probability of an event can be
- (A) -0.04
(B) 1.00009
(C) $\frac{18}{23}$
(D) More than one of the above
(E) None of the above



- 79.** The angle of depression of a car, parked on the road, from the top of a 150 m high tower is 30° . The distance of the car from the tower is
- (A) $50\sqrt{3}$ m
(B) $150\sqrt{3}$ m
(C) 75 m
(D) More than one of the above
(E) None of the above
- 80.** A hemispherical bowl of internal diameter 36 cm is full of liquid. The liquid is to be filled into cylindrical shaped bottles each of radius 3 cm and height 9 cm. The number of bottles is
- (A) 96
(B) 48
(C) 24
(D) More than one of the above
(E) None of the above
- 81.** A kite is flying at a height of 30 m from the ground. The length of the string from the kite to the ground is 60 m. Assuming that there is no slack in the string, the angle of elevation of the kite at the ground is
- (A) 45°
(B) 60°
(C) 30°
(D) More than one of the above
(E) None of the above
- 82.** A carton consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Jimmy, a trader, will only accept the shirts which are good, but Sujata, another trader, will only reject the shirts which have major defects. One shirt is drawn at random from the carton. The probabilities that it is not acceptable to Jimmy and acceptable to Sujata are
- (A) 0.12, 0.96
(B) 0.88, 0.96
(C) 0.12, 0.04
(D) More than one of the above
(E) None of the above
- 83.** Find the area of the triangle whose sides are 42 cm, 34 cm and 20 cm.
- (A) 330 cm^2
(B) 360 cm^2
(C) 336 cm^2
(D) More than one of the above
(E) None of the above



- 84.** The denominator of a fraction is two more than its numerator. If the sum of the fraction and its reciprocal is $2\frac{4}{15}$, then the fraction is
- (A) $\frac{5}{3}$
- (B) $\frac{3}{5}$
- (C) $\frac{5}{7}$
- (D) More than one of the above
- (E) None of the above
- 85.** The cost of carpeting a room 15 m long with a carpet 75 cm wide at ₹70 per metre is ₹8,400. The width of the room is
- (A) 9 m
- (B) 8 m
- (C) 6 m
- (D) More than one of the above
- (E) None of the above
- 86.** If seven times the seventh term of an AP is equal to eleven times its eleventh term, then its eighteenth term is equal to
- (A) -17
- (B) -1
- (C) 0
- (D) More than one of the above
- (E) None of the above
- 87.** A wire is looped in the form of a circle of radius 28 cm. It is rebent into a square form. Determine the length of the side of the square.
- (A) 44 cm
- (B) 54 cm
- (C) 40 cm
- (D) More than one of the above
- (E) None of the above
- 88.** Given
- $$x = \frac{1}{2 - \left\{ \frac{1}{2 - \left(\frac{1}{2 - x} \right)} \right\}}, \quad (x \neq 2)$$
- then x is equal to
- (A) 1, 1
- (B) -1, 1
- (C) -1, -1
- (D) More than one of the above
- (E) None of the above

- 89.** The area of a sector of angle θ° of a circle with radius R is
- (A) $\frac{2\pi R\theta}{180}$
- (B) $\frac{2\pi R\theta}{360}$
- (C) $\frac{\pi R^2\theta}{360}$
- (D) More than one of the above
- (E) None of the above
- 90.** The ratio of incomes of two persons is $9 : 7$ and the ratio of their expenditures is $4 : 3$. If each of them manages to save ₹2,000 per month, then their monthly incomes are
- (A) ₹18,000 and ₹14,000
- (B) ₹27,000 and ₹21,000
- (C) ₹36,000 and ₹28,000
- (D) More than one of the above
- (E) None of the above
- 91.** A factory manufactures 120000 pencils daily. The pencils are cylindrical in shape, each of length 25 cm, and circumference of base is 1.5 cm. Then the cost of colouring the curved surfaces of the pencils manufactured in one day at ₹0.05 per dm^2 is
- (A) ₹22,500
- (B) ₹2,25,000
- (C) ₹2,250
- (D) More than one of the above
- (E) None of the above
- 92.** Consider the system of linear equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. The coordinates of the vertices of the triangle formed by these lines and the y -axis are
- (A) $(2, -1)$, $(0, 5)$ and $(0, -5)$
- (B) $(2, -1)$, $(5, 0)$ and $(-5, 0)$
- (C) $(2, 3)$, $(0, 1)$ and $(0, 6)$
- (D) More than one of the above
- (E) None of the above
- 93.** A cubical ice-cream bar of edge 22 cm is to be distributed among some children by filling ice-cream cones of radius 2 cm and height 7 cm up to its brim. How many children will get the ice-cream cones?
- (A) 163
- (B) 263
- (C) 363
- (D) More than one of the above
- (E) None of the above



- 94.** If O is any point inside a rectangle $ABCD$, then
- (A) $OB^2 + OD^2 = OA^2 + OC^2$
(B) $OB^2 + OA^2 = OD^2 + OC^2$
(C) $OA^2 + OD^2 = OB^2 + OC^2$
(D) More than one of the above
(E) None of the above
- 95.** If the point $C(1, 1)$ divides the line segment joining $A(-2, 7)$ and B in the ratio $3 : 2$ internally, the coordinates of B are
- (A) $(-3, 3)$
(B) $(3, -3)$
(C) $(3, 3)$
(D) More than one of the above
(E) None of the above
- 96.** A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, the production of TV sets in the 10th year is
- (A) 850
(B) 1000
(C) 775
(D) More than one of the above
(E) None of the above
- 97.** Rajveer saves ₹ 32 during the first month, ₹ 36 during the second month and ₹ 40 during the third month. If she continues to save in this manner, she will be able to save ₹ 2,000 in
- (A) 20 months
(B) 30 months
(C) 35 months
(D) More than one of the above
(E) None of the above
- 98.** In an examination, one student secured 30% marks and failed by 45 marks. Another student secured 42% marks and got 45 marks more than minimum passing marks. Find the total marks.
- (A) 270
(B) 750
(C) 850
(D) More than one of the above
(E) None of the above
- 99.** The mean of 20 numbers is zero. Of them, at the most, how many may be greater than zero?
- (A) 19
(B) 1
(C) 10
(D) More than one of the above
(E) None of the above



- 100.** Suhit borrowed ₹6,300 at the rate of 14% for 3 years on simple interest from Vikas. Suhit added some amount in the principal amount and gave it to Mohit at the rate of 16% for the same period with simple interest. During this transaction, Suhit earned ₹618. The amount which Suhit gave to Mohit was
- (A) ₹7,000
(B) ₹6,800
(C) ₹7,200
(D) More than one of the above
(E) None of the above
- 101.** For a symmetrical frequency distribution, we have
- (A) mean < median < mode
(B) mean > mode > median
(C) mean = median = mode
(D) More than one of the above
(E) None of the above
- 102.** One wall clock was set at 8:00 a.m. in the morning. This clock runs 10 minutes fast during 24 hours. Next day when this clock shows 1:00 p.m. in the afternoon, the correct time is
- (A) 40 minutes passed 12 noon
(B) 45 minutes passed 12 noon
(C) 48 minutes passed 12 noon
(D) More than one of the above
(E) None of the above
- 103.** The mean and mode of a frequency distribution are 28 and 16 respectively. The median is
- (A) 24
(B) 23.5
(C) 22
(D) More than one of the above
(E) None of the above
- 104.** Some money has been borrowed on compound interest. After 2 years and 3 years, the principal turns out to be ₹9,680 and ₹10,648 respectively. Then the principal is
- (A) ₹8,000
(B) ₹9,000
(C) ₹7,000
(D) More than one of the above
(E) None of the above
- 105.** Two different dice are rolled together. Find the probability of getting the sum of numbers on two dice to be 5.
- (A) $\frac{1}{9}$
(B) $\frac{1}{4}$
(C) $\frac{1}{6}$
(D) More than one of the above
(E) None of the above

- 106.** When $(x^{31} + 31)$ is divided by $(x + 1)$, the remainder is
- (A) 0
(B) 1
(C) 30
(D) More than one of the above
(E) None of the above
- 107.** One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number, which is a multiple of 7, is
- (A) $\frac{1}{7}$
(B) $\frac{1}{8}$
(C) $\frac{7}{40}$
(D) More than one of the above
(E) None of the above
- 108.** A person bought a horse and a car for ₹ 20,000. He sold the horse with 20% profit and sold the car with 10% loss. In this transaction, he earned 2% profit. Then the purchase cost of the horse is
- (A) ₹ 7,200
(B) ₹ 7,500
(C) ₹ 8,000
(D) More than one of the above
(E) None of the above
- 109.** In a lottery, there are 6 prizes and 24 blanks. What is the probability of not getting a prize?
- (A) $\frac{3}{4}$
(B) $\frac{3}{5}$
(C) $\frac{4}{5}$
(D) More than one of the above
(E) None of the above
- 110.** The quadratic equation $ax^2 + bx + c = 0$ ($a \neq 0$) has two distinct real roots if
- (A) the discriminant > 0
(B) the discriminant $= 0$
(C) the discriminant < 0
(D) More than one of the above
(E) None of the above
- 111.** a and b are two positive integers such that the least prime factor of a is 2 and the least prime factor of b is 5. Then the least prime factor of $a + b$ is
- (A) 3
(B) 5
(C) 8
(D) More than one of the above
(E) None of the above



112. The line segment XY is parallel to the side AC of $\triangle ABC$ and it divides the triangle into two parts of equal areas. Then the ratio $\frac{AX}{AB}$ is

(A) $\frac{2+\sqrt{2}}{2}$

(B) $\frac{2-\sqrt{2}}{2}$

(C) $\frac{3+\sqrt{2}}{2}$

(D) More than one of the above

(E) None of the above

113. Which term of the AP

72, 63, 54, ...

is 0?

(A) 8th

(B) 9th

(C) 10th

(D) More than one of the above

(E) None of the above

114. Consider a polynomial

$$x^4 + x^3 - 9x^2 - 3x + 8$$

Given that two of its zeros are $-\sqrt{3}$ and $\sqrt{3}$. Then the remaining zeros are

(A) -3, -2

(B) 3, -2

(C) 3, 2

(D) More than one of the above

(E) None of the above

115. If $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$ and

$0^\circ < \theta < 90^\circ$, then the angle θ is

(A) 30°

(B) 60°

(C) 45°

(D) More than one of the above

(E) None of the above

116. If $\tan^2 \theta = 1 + 2 \tan^2 \alpha$, then $\sin^2 \theta$ is equal to

(A) $\frac{1}{2}(1 + \sin^2 \alpha)$

(B) $1 + \sin^2 \alpha$

(C) $\frac{1}{2}(1 + \cos^2 \alpha)$

(D) More than one of the above

(E) None of the above

- 117.** Taxi charges in a city consist of fixed charges and the remaining depending upon the distance travelled in kilometres. If a person travels 60 km, he pays ₹ 960 and for travelling 80 km, he pays ₹ 1,260. Find the fixed charges and the rate per kilometre.
- (A) ₹ 60 and ₹ 15/km
 (B) ₹ 40 and ₹ 25/km
 (C) ₹ 30 and ₹ 15/km
 (D) More than one of the above
 (E) None of the above
- 118.** A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height h . At a point on the plane, the angles of elevation of the bottom and top of the flagstaff are α and β respectively. Then the height of the tower is
- (A) $\frac{\tan \alpha}{h(\tan \beta - \tan \alpha)}$
 (B) $\frac{\tan \alpha}{h(\tan \beta + \tan \alpha)}$
 (C) $\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$
 (D) More than one of the above
 (E) None of the above
- 119.** A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/sec. If the lamp is 3.6 m above the ground, then the length of the shadow of the girl after 4 seconds is
- (A) 1.6 m
 (B) 1.5 m
 (C) 1.06 m
 (D) More than one of the above
 (E) None of the above
- 120.** $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1}$ is equal to
- (A) $\frac{1}{\sec \theta - \tan \theta}$
 (B) $\frac{1}{\operatorname{cosec} \theta - \cot \theta}$
 (C) $\frac{1}{\cot \theta - \tan \theta}$
 (D) More than one of the above
 (E) None of the above

