Master Cadre Maths - June 2021

Q1. True stands for
(a) 0 (b) 1 (c) -1 (d) 2

Q2. The integral $\int \frac{\sin x}{\sin(x-\alpha)}dx$ -
(a) x cos α – sin α log sin (x – α) + c
(b) x cos α log sin (x – α) + c
(c) x sin α – sin α log sin (x – α) + c
(d) None of these

Q3. If (1 – y) $x\frac{dy}{dx}+(1+x)y=0$, then solution of above equation is
(a) log xy + x + y ≡ c
(b) log xy – x – y ≡ c
(c) log xy + x - y ≡ c
(d) none of these

Q4. The solution of the differential equation y dx + (x + x^2y) dy = 0 is
(a) $-\frac{1}{xy}+\log y=c$
(b) $-\frac{1}{xy}=c$
(c) $\frac{1}{xy}+\log y=c$
(d) log y = cx

Q5. Solution of the differential equation $(1+x^2)\frac{dy}{dx}+y=\tan^{-1}x$ is
(a) $ye^{\tan^{-1}x}=(1-\tan^{-1}x)e^{\tan^{-1}y}+c$
(b) $y=\tan^{-1}x-1+ce^{-\tan^{-1}x}+c$
(c) $x=\tan^{-1}y+ce^{-\tan^{-1}x}+c$
(d) $x=\tan^{-1}y+e^{-\tan^{-1}x}+c$

Q6. The solution of the equation $\frac{dy}{dx}+2y=\sin x$ is
(a) y = 5(2 sin x – cos x) + ce^{-2x}
(b) y = (2 sin x – cos x) + ce^{-x}
(c) y = 2cos x – sin x)+ ce^{-2x}
(d) y= $\frac{1}{5}$(2 sin x – cos x) + ce^{-2x}

Q7. Solution of the equation $\sin 2x\frac{dy}{dx}-y=\tan x$ is
(a) y = tan x + $c\sqrt{\tan x}$
(b) x – y sin x = c
(c) xy tan x = c
(d) None of these

Q8. A single letter is selected at random from the word “PROBABILITY”. The probability that it is a vowel is
(a) $\frac{3}{11}$ (b) $\frac{4}{11}$ (c) $\frac{2}{11}$ (d) 0

Q9. Three mangoes and the three apple are in a box. If two fruits are chosen at random, the probability that one is a mango and the other is an apple, is

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

Q10. A card is drawn at random from a pack of 100 cards numbered 1 to 100. The probability of drawing a number which is a square is

(a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) $\frac{1}{10}$ (d) None of these

Q11. The time taken by a projectile thrown with a velocity v m/s at an angle α with the horizontal to attain the maximum height is given by

(a) $\frac{v\sin\alpha}{g}$ (b) $(v\sin\alpha)g$ (c) $\frac{v}{\sin\alpha}$ (d) $\frac{v}{g}$

Q12. From the top of a tower of height 100m, a ball is projected with a velocity of 10 m/s. it takes 5 seconds to reach the ground, if g = 10 m/s^2, then the angle of projection is:

(a) 45° (b) 30° (c) 60° (d) 90°

Q13. A man can throw a stone 80 metres. The maximum height to which it will rise in metres is:

(a) 10 (b) 20 (c) 30 (d) 40

Q14. The horizontal range of a projectile is $4\sqrt{3}$ times its maximum height. The angle of projection is:

(a) 30° (b) 45° (c) 60° (d) None of these

Q15. In the expansion of (1 + x)^{50}, the sum of coefficients of odd powers of x is

(a) 0 (b) 2^{49} (c) 2^{50} (d) 2^{51}

Q16. The argument of $\frac{(1-i\sqrt{3})}{1+i\sqrt{3}}$ is

(a) 60° (b) 120° (c) 210° (d) 240°

Q17. If |z| = 1 and $w=\frac{z-1}{z+1}$ (where z ≠ -1) the Re(w) is:

(a) 0 (b) -1 (c) 1 (d) None of these

Q18. The complex number sin x + i cos 2x and cos x – i sin 2x are conjugate to each other for

(a) $x=n\pi$ (b) $x=\left(n+\frac{1}{2}\right)\pi$ (c) x = 0 (d) No value of x

Q19. The negation of $p \Rightarrow q$ is:

(a) $p \wedge \urcorner q$ (b) $p \Rightarrow q$ (c) $q \Rightarrow p$ (d) $p \vee \urcorner q$

Q20. which of these is false?

(a) $p \vee q$ (b) $\urcorner p \wedge q$ (c) $p \wedge q$ (d) $p \Rightarrow q$

Q21. $\int_0^\infty \frac{1}{1+e^x}dx$ =

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(a) log 2 – 1 (b) log 2 (c) log 4 -1 (d) –log 2

Q22. $\int \frac{1}{x(x^n+1)}dx =$

(a) $\frac{1}{n}\log\left(\frac{x^n}{x^n+1}\right)$ (b) $\log\left(\frac{x^n}{x^n+1}\right)$

(c) $\frac{1}{2n}\log\left(\frac{x^n}{x^n+1}\right)$ (d) None of these

Q23. A particle moves along x – axis such that its distance form the origin at the end of time t minutes is given by $x=\sqrt{t^2+1}-2t$. Its acceleration a $t=\sqrt{3}$ is

(a) $2-2\sqrt{3}$ (b) $\frac{1}{2}\left(\sqrt{3}-4\right)$ (c) $\frac{1}{8}$ (d) $\frac{1}{2}$

Q24. A particle moves in a straight line with a velocity given by $\frac{dx}{dt}=x+1$. The time taken by the particle to travel a distance of 99 metres is

(a) $\log_{10}e$ (b) $2\log_e 10$ (c) $2\log_{10}^e$ (d) $\frac{1}{2}\log_{10}e$

Q25. A particle is projected with velocity of 39.2 m/s at an angle of 30° with the horizontal, it will move at right angle to the direction of projection after the time:

(a) 8 sec (b) 5 sec (c) 6 sec (d) 10 sec

Q26. If the maximum range upon inclined plane be one third of the maximum range down the plane, then the inclination of the plane to the horizontal is:

(a) 15° (b) 30° (c) 45° (d) 60°

Q27. One die and one coin are tossed simultaneously. The probability of getting 6 on die and head on coin is

(a) $\frac{1}{2}$ (b) $\frac{1}{6}$ (c) $\frac{1}{12}$ (d) None of these

Q28. In a box containing 100 bulbs, 10 are defective. What is the probability that out of a sample of 5 bulbs, none is defective?

(a) 10^{-5} (b) $\left(\frac{1}{2}\right)^5$ (c) $\frac{9}{10}$ (d) $\left(\frac{9}{10}\right)^5$

Q29. It is given that events A and B are such that $P(A)=\frac{1}{4}, P\left(\frac{A}{B}\right)=\frac{1}{2}$ and $P\left(\frac{B}{A}\right)=\frac{2}{3}$

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $d=\frac{1}{2}$

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Q30. If ${}^{56}P_{r+6} : {}^{54}P_{r+3} \equiv 30800 : 1$, then r ≡

(a) 51 (b) 53 (c) 50 (d) 41

Q31. The resultant of two forces P and Q in R. if Q is doubled, R is also doubled, and If Q is reversed, R is again doubled the P^2: Q^2 :R^2 is given by

(a) 1:1:1 (b) 2:2:3 (c) 2:3:2 (d) 3:2:2

Q32. A given force is resolved into components P and Q equally inclined to it, then

(a) P = Q (b) P = 2Q (c) 2P = Q (d) None of these

Q33. Forces 7, 5 and 3 acting on a particle are in equilibrium. The angle between the pair of forces 5 and 3 is:

(a) 120° (b) 90° (c) 60° (d) 30°

Q34. If the greatest and least resultants of two forces are P and Q respectively, then the resultant of these force, when acting at right angles, will be.

(a) $\frac{\sqrt{P^2 - Q^2}}{2}$ (b) $\frac{P-Q}{2}$ (c) $\frac{P+Q}{2}$ (d) $\frac{\sqrt{P^2 + Q^2}}{2}$

Q35. Two parallel forces not having the same line of action form a couple if they are

(a) like an unequal (b) like and equal

(c) unequal and unlike (d) equal and unlike

Q36. Two forces P and Q acting parallel to the length and base of an inclined plane respectively would each of them singly support a weight W on the plane, then $\frac{1}{P^2} - \frac{1}{Q^2} =$

(a) $\frac{1}{W^2}$ (b) $\frac{2}{W^2}$ (c) $\frac{3}{W^2}$ (d) None of these

Q37. The function f(x) = cos x is

(a) Increasing in $(0, 2\pi)$ (b) Decreasing in $(0, 2\pi)$

(c) Neither increasing or decreasing (d) None of these

Q38. The interval in which the function $f(x) = \sin 3x, x \in \left[0, \frac{\pi}{2}\right]$ is decreasingis:

(a) $\left(0, \frac{\pi}{6}\right)$ (b) $\left(\frac{\pi}{6}, \frac{\pi}{2}\right)$ (c) $\left(0, \frac{\pi}{6}\right]$ (d) $\left[\frac{\pi}{6}, \frac{\pi}{2}\right)$

Q39. The point on the curve $\frac{x^2}{4} + \frac{y^2}{25} = 1$ at which tangent are parallel to x – axis, are

(a) $(0, \pm 2)$ (b) $(\pm 5, 0)$ (c) $(\pm 2, 0)$ (d) $(0, \pm 5)$

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Q40. The equation of normal to the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = 2$ at (1, 1) is

(a) y – x = 0 (b) x – y + 1= 0 (c) –x + y+ 1 =0 (d) None of these

Q41. Equation of the tangent to the curve x = a sin^3 t, y = b cos^3 t at a point where $t = \frac{\pi}{2}$, is:

(a) x = 0 (b) y = 0 (c) x – y = 0 (d) x + y = 0

Q42. Equation of normal at (x_1, y_1) to a curve y = f(x) is:

(a) $y - y_1 = -\frac{dx}{dy}(x - x_1)$ (b) $y - y_1 = -\frac{dy}{dx}(x - x_1)$

(c) $x - x_1 = -\frac{dx}{dy}(y - y_1)$ (d) None of these.

Q43. $f(x) = x^3(x-1)^2$ has maxima & minima at

(a) $x = \frac{3}{5}$ is a point of minima, x = -1 is a point of maxima

(b) $x = \frac{3}{5}$ is a point of minima, x = 1 is a point of maxima

(c) $x = -\frac{3}{5}$ is a point of minima, x = -1 is a point of maxima

(d) None of these

Q44. If f(x) = xe^x, then its local minimum value is

(a) e (b) $\frac{1}{e}$ (c) 1 (d) $-\frac{1}{e}$

Q45. f(x) = |x + 2| on R, then which of the following is true?

(a) Maximum at x =0 (b) Minimum at x = 0

(c) Dose not have a maximum value (d) Dose not have a minimum value

Q46. The sides of an equilateral triangle are increasing at the rate of 2 cm/s. the rate at which the area increases, when the side is 10 is

(a) $10\sqrt{3}cm^2/s$ (b) $10\sqrt{2}cm^2/s$ (c) $3\sqrt{10}cm^2/s$ (d) $3\sqrt{5}cm^2/s$

Q47. The interval in which the function f(x) = 2x^2 – 3x is strictly decreasing in

(a) $\left(-\infty, \frac{3}{2}\right)$ (b) $\left(-\infty, \frac{3}{4}\right)$ (c) $\left(\frac{3}{4}, \infty\right)$ (d) $\left(-\frac{3}{4}, \infty\right)$

Q48. What is the sum of the 11 terms of an A.P. if the 3rd term is -1 and 8th term is 19?

(a) 204 (b) 225 (c) 104 (d) 121

Q49. If 7times the seventh term of an A.P. is equal to 11 times the elevent term, then 18th term of A.P. will be

(a) 1 (b) 0 (c) 2 (d) -1

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Q50. The equation of the perpendicular bisector of segment joining the points (2, -6) and (4, 0)
(a) x+3y = 6 (b) x – 3y = 6 (c) x + 3y = -6 (d) x – 3y = -6

Q51. The co-ordinates of the centroid of a triangle ABC are (2, 2). What are the co – ordinates of vertex C if co – ordinates of A and B are (7, -1) and (1. 2) respectively.
(a) (-2, 5) (b) (2, 5) (c) (-2, -5) (d) (2,-5)

Q52. What is the equation of the line perpendicular to the line 5x + 3y = 6 and having y – intercept – 3?
(a) 3x – 5y = -15 (b) 3x – 5y = 15
(c) 3x + 5y = 15 (d) 3x + 5y = -15

Q53. The radius and centre of the circle $9x^2 + 9x^2 – 6x - 36y – 107 = 0$ is
(a) r = 4, centre is $\left(\frac{1}{3},2\right)$ (b) r = 3, centre is $\left(2,\frac{1}{3}\right)$
(c) r = 4, centre is $\left(-\frac{1}{3},2\right)$ (d) None of these

Q54. Which of the following is true?
(a) Z_n is cyclic but not abelian (b) Z_n is cyclic and abelian
(c) Z_n is non – cyclic but abelian (d) Z_n is neither cyclic nor abelian

Q55. Every group of order 5 is
(a) Cyclic (b) Non – cyclic (c) Non – abelian (d) None of these.

Q56. The centre of a group is
(a) Not a subgroup (b) Is a subgroup but not normal
(d) Is a subgroup which is normal (d) None of these

Q57. Set of even integers is
(a) a group under multiplication
(b) a field under addition and multiplication
(c) not a field under addition and multiplication
(d) None of these

Q58. The set of all matrices of the form $\begin{bmatrix} 0 & a \\ 0 & b \end{bmatrix}$,a ,b are reals with matrix addition and multiplication, is
(a) not a ring (b) abelian group under multiplication
(c) a group under multiplication (d) a ring

Q59. The set {1, w, w^2} where 1, w, w^2 are cube roots od unity is
(a) an abelian group under multiplication
(b) not a group under multiplication
(c) a group but not abelian
(d) None of these

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Q60. If $\vec{a} \times \vec{b} = \vec{0}$ then which of the following is true?

(a) $\vec{a} = 0$ (b) $\vec{b} = 0$

(c) either $\vec{a}$ or $\vec{b}$ is zero (d) None of these

Q61. The area of the triangle with vertices A(1, 1, 2), B(2, 3, 5) and (1, 5, 5) is

(a) $\frac{51}{2}$ (b) $\frac{61}{2}$ (c) $\frac{\sqrt{61}}{2}$ (d) $\frac{\sqrt{51}}{2}$

Q62. Let $\vec{a}$ and $\vec{b}$ vectors be such that $|\vec{a}| = 3, |\vec{b}| = \frac{\sqrt{2}}{3}$, then $\vec{a} \times \vec{b}$ is unit vector is angle between $\vec{a}$ and $\vec{b}$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

Q63. The area of the parallelgram whose adjacent sides are given by the vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$

(a) $15\sqrt{2}$ (b) $13\sqrt{2}$ (c) $16\sqrt{2}$ (d) $18\sqrt{2}$

Q64. The vertices of a rectangle are given by the position vectors $-\hat{i} + \frac{\hat{j}}{2} + 4\hat{k}, \hat{i} + \frac{\hat{j}}{2} + 4\hat{k}, \hat{i} - \frac{\hat{j}}{2} + 4\hat{k}$ and $-\hat{i} - \frac{\hat{j}}{2} + 4\hat{k}$. Its area is

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

Q65. The equation $2x^2 + kx + 3 = 0$ has two equal roots, then the value of k is

(a) $\pm 2\sqrt{6}$ (b) $\pm 3\sqrt{2}$ (c) ± 4 (d) $\pm \sqrt{6}$

Q66. If the root of $ax^2 + bx + c = 0$ are in the ratio m:n, then

(a) $mna^2 = (m+n)c^2$ (b) $mnb^2 = (m+n)ac$

(c) $mnb^2 = (m+n)^2ac$ (d) $mnb^2 = (m-n)^2ac$

Q67. If one root pf the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal rots, the value of q is

(a) $\frac{49}{4}$ (b) $\frac{4}{49}$ (c) 4 (d) 49

Q68. Mohan and Sohan solve an equation. In solving Mohan commits a mistake in constant term and find the roots 8 and 2. Sohan commits a mistake in the co – efficient of x and find the roots as -9 and -1. Then correct roots are

(a) -9, 1 (b) 9, 1 (c) 9, -1 (d) -9, -1

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Q69. The roots of the quadratic equation $\frac{1}{a+b+x}=\frac{1}{a}+\frac{1}{b}+\frac{1}{x}, a+b\neq 0$ is

(a) a, b (b) –a, b (c) a, -b (d) –a, -b

Q70. If the roots of the equation $ax^2 + 2bx + c = 0$ and $bx^2 - 2\sqrt{ac}x+b=0$ are simultaneously real, then

(a) b = ac (b) $b^2 = ac$ (c) $a^2 = bc$ (d) $c^2 = ab$

Q71. A chess board contain 64 squares and the area of each square is 6.25 cm^2. A border round the board is 2 cm wide. The length of side of the chess board is:

(a) 8 cm (b) 12 cm (c) 24 cm (d) 36 cm

Q72. There are 12 points in a plane out of which 5 are collinear. The number of triangles formed by the points as vertices is

(a) 185 (b) 210 (c) 220 (d) 175

Q73. Four dice are rolled. The number of possible outcome in which at least one dice show 2 is is

(a) 671 (b) 625 (c) 1296 (d) 585

Q74. If repetition of the digits is allowed, then the number of even natural numbers having three digits is

(a) 250 (b) 350 (c) 450 (d) 550

Q75. 6 men and 4 women are to be seated in a row so that no two women sit together. The number of ways they can be seated is

(a) 518400 (b) 17280 (c) 120960 (d) 604800

Q76. A student is to answer 10 out of 13 question in an examination such that he must choose at least 4 from the first five question. The number of choices available to him is

(a) 40 (b) 196 (c) 280 (d) 346

Q77. Solution of the inequality $\frac{x}{2}\geq\frac{5x-2}{3}-\frac{7x-3}{5}$ is

(a) $x\geq -\frac{2}{7}$ (b) $x\leq\frac{2}{7}$ (c) $x\leq -\frac{2}{7}$ (d) $x\geq\frac{2}{7}$

Q78. Solution of the inequality $\frac{1}{2}\left(\frac{3x}{5}+4\right)\geq\frac{1}{3}(x-6)$

(a) $\left(\frac{20}{3},\infty\right)$ (b) $\left(-\infty,\frac{20}{3}\right)$ (c) $(-\infty,120)$ (d) $(120,\infty)$

Q79. A man wants to cut three lengths from a single piece of board of length 91 cm. The second length is to be 3cm longer then the shortest and the third length is be twice as long as the shortest. What are the possible lengths of the shortest board if the third piece is to be at least 5 cm longer than the second.

(a) [8, 25] (b) [7, 18] (c) [8, 17] (d) [8, 22)

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Q80. How many pairs of consecutive odd natural numbers both of which are larger than 10 such that their sum is less than 40.
(a) 3 (b) 4 (c) 5 (d) 7

Q81. Ravi obtained 70 and 75 marks in the first two unit tests. Find the minimum marks he should get in the third test to have an average of at 60 marks.
(a) 135 (b) 150 (c) 128 (d) 11

Q82. The solution set of inequalities x + 5 > 2x + 2 and 2 – x < 3x + 6 is
(a) $(-1,\infty)$ (b) $(3,\infty)$ (c) $(-1,3)$ (d) $(-3,\infty)$

Q83. The solution set $\frac{2x-3}{4}-2\geq\frac{4x}{3}-6$ and 2(2x + 3) < 6(x – 2) + 10 is
(a) No solution (b) $(8,\infty)$ (c) $\left(-\infty,\frac{39}{10}\right)$ (d) None of these

Q84. The direction cosines of the line making equal angles with co-ordinate axes are
(a) $<\frac{1}{3},\frac{1}{3},\frac{1}{3}>$ (b) <1,1,1>
(c) $<\frac{1}{\sqrt{3}},-\frac{1}{\sqrt{3}},\frac{1}{3}>$ (d) $<\pm\frac{1}{\sqrt{3}},+\frac{1}{\sqrt{3}},\pm\frac{1}{\sqrt{3}}>$

Q85. The point (2,3,4), (-1,-2,1), (5,8,7)
(a) form a triangle (b) a right triangle
(c) collinear (d) non – collinear

Q86. The line through the points (4,7,8) and (2,3,4) and the line passing through the points (-1,-2,1), (1,2,5) are
(a) intersecting (b) parallel (c) perpendicular (d) None of these

Q87. The equation of the line which passes through the point (1,2,3) and parallel to the vector $3\hat{i}+2\hat{j}-2\hat{k}$ is
(a) $\vec{r}=\hat{i}+2\hat{j}+3\hat{k}+\lambda(3\hat{i}+2\hat{j}-2\hat{k})$ (b) $\vec{r}=3\hat{i}+2\hat{j}+2\hat{k}+\lambda(\hat{i}+2\hat{j}-2\hat{k})$
(c) $\vec{r}=2\hat{i}+0\hat{j}-5\hat{k}+\lambda(\hat{i}-\hat{j})$ (d) None of these

Q88. The equation of the line passing through the points (3, -2,-5), (3,-2,6) is
(a) $\frac{x-3}{3}=\frac{y+2}{4}=\frac{z-6}{5}$ (b) $\frac{x+3}{1}=\frac{y+2}{0}=\frac{z-6}{5}$
(c) $\frac{x-3}{0}=\frac{y-2}{0}=\frac{z-6}{1}$ (d) $\frac{x-3}{0}=\frac{y+2}{6}=\frac{z+5}{11}$

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Q89. The value p for which the lines $\frac{1-x}{3}=\frac{7y-14}{2p}=\frac{z-3}{2}$ and $\frac{7-7x}{3p}=\frac{y-5}{1}=\frac{6-z}{5}$ are at right angles

(a) $\frac{11}{17}$ b) $\frac{15}{23}$ (c) $\frac{70}{11}$ (d) None of these

Q90. Angle between the line $\frac{x}{2}=\frac{y}{2}=\frac{z}{1}$ and $\frac{x-5}{4}=\frac{y-5}{1}=\frac{z-3}{8}$ is

(a) $\cos^{-1}\left(\frac{4}{5}\right)$ (b) $\cos^{-1}\left(\frac{2}{3}\right)$ (c) $\cos^{-1}\left(\frac{4\sqrt{3}}{5}\right)$ (d) $\cos^{-1}\left(\frac{2}{\sqrt{3}}\right)$

Q91. The centre of the circle passing through (0,0) and (1,0) and touching the circle $x^2 + y^2 = 9$ is

(a) $\left(\frac{1}{2},\sqrt{2}\right)$ (b) $\left(\frac{1}{2},\frac{1}{2}\right)$ (c) $\left(\frac{1}{2},\frac{3}{2}\right)$ (d) $\left(\frac{3}{2},\frac{1}{2}\right)$

Q92. The point on the parabola $y^2 = 12x$ at which the ordinate is double the abscissa is

(a) (-3,9) (b) (-2,4) (c) (4,8) (d) (3,6)

Q93. The equation of the parabola whose co – ordinates of vertex and focus are (-2,3) and (1,3) respectively is

(a) $x^2 – 2x + 3y = 12$ (b) $y^2 – 3x + 2y = 4$
(c) $y^2 – 6y – 12x = 15$ (d) $x^2 – 3x + 4y = 4$

Q94. The axis of the parabola $y^2 + 4x + 2y – 11 = 0$ is

(a) y -2 = 0 (b) y + 1 = 0 (c) x – 1 = 0 (d) x + 2 = 0

Q95. The equation of the parabola whose directrix is x + 5 = 0 and focus is (-3, 0) is

(a) $y^2 = 4x + 16$ (b) $y^2 = -4x + 16$ (c) $x^2 = 4y – 15$ (d) $x^2 = 4y + 11$

Q96. Where does the point (-1,-5) lie w.r.t the parabola $y^2 = 8x$?

(a) on (b) within (c) outside (d) none of these

Q97. The standard equation are of the ellipse whose end points of major axis are (-11,1) and (7,1) end points of minor axis are (-2,-2) and (-2, 4) is

(a) $\frac{(X-3)^2}{49}+\frac{(y-2)^2}{36}=1$ (b) $\frac{(X+3)^2}{81}+\frac{(y-2)^2}{9}=1$

(c) $\frac{(X-2)^2}{9}+\frac{(y-1)^2}{81}=1$ (d) $\frac{(X+2)^2}{81}+\frac{(y-1)^2}{9}=1$

Q98. The eccentricity of the following hyperbola $4x^2 – 3y^2 – 8x – 8 = 0$ is

(a) $\frac{\sqrt{21}}{3}$ (b) $\frac{\sqrt{7}}{3}$ (c) $\frac{7}{\sqrt{3}}$ (d) None of these

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Q99. The transverse axis of hyperbola is 12 and the curve passes through the points (8, 14). Its equation

(a) $\frac{x^2}{64}-\frac{y^2}{144}=1$ (b) $\frac{x^2}{36}-\frac{y^2}{252}=1$

(c) $\frac{x^2}{144}-\frac{y^2}{196}=1$ (d) $\frac{x^2}{36}-\frac{y^2}{196}=1$

Q100. The equation of the locus of points (x,y) whose sum of distances from the fixed points (4,2) and (-2,2) is equal to 8 is

(a) $7x^2 + 11y^2 – 13x – 14y + 41 = 0$ (b) $11x^2 + 7y^2 – 13x + 41 = 0$

(c) $7x^2 + 16y^2 – 14x – 64y – 41 = 0$ (d) $13x^2 + 4y^2 – 15x + 4y + 13 = 0$

Q101. The equation of the ellipse centered at (0,0) knowing that it passes through the point (0,4) and eccentricity $\frac{3}{5}$ is

(a) $\frac{x^2}{25}+\frac{y^2}{16}=1$ (b) $\frac{x^2}{16}+\frac{y^2}{25}=1$

(c) $\frac{x^2}{9}+\frac{y^2}{25}=1$ (d) $\frac{x^2}{25}+\frac{y^2}{9}=1$

Q102. The mean deviation from mean of observation 5,10,15,20….85 is

(a) 43.71 (b) 21.17 (c) 38.7 (d) None of these

Q103. The mean deviation about median for the series 2,3,x,10,17 is4.4. What is the value of x?

(a) 3 (b) 5 (c) 7 (d) 17

Q104. The variance of the observations 4.2, 4.3,4, 4.1 is

(a) 0.27 (b) 0.28 (c) 0.3 (d) 0.31

Q105. If the S.D of a data is 0.012 then variance is

(a) 0.144 (b) 0.00144 (c) 0.000144 (d) 0.0000144

Q106. If the S.D of a set of observations is 4 and if each observation is divided by 4, then S.D of new observation is

(a) 4 (b) 3 (c) 2 (d) 1

Q107. The mean of 5 observations is 3 and variance is 2. If three of the five observations are 1,3,5 find the other two.

(a) 2,5 (b) 3,5 (c) 2,4 (d) 4,5

Q108. $1^2 + 3^2 + 5^2+…+ (2n – 1)^2$

(a) $\frac{n(2n-1)(2n+1)}{3}$ (b) $\frac{n(n+1)(2n+1)}{6}$

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(c) $\frac{n(n-1)(2n+1)}{3}$ (d) $\frac{n(n+1)(n+3)}{3}$

Q109. If a,b are two positive integers then which of the following is true?

(a) (g.c.d(a,b)) (l.c.m of (a,b)) = ab (b) $\frac{(g.c.d(a,b)}{(l.c.m(a,b)} = ab$

(c) (g.c.d(a,b)).a = (l.c.m of (a,b)) b (d) None of these

Q110. If (a,mn) = 1 then

(a) (a,m) = 1 only (b) (a,n) = 1 only

(c) (a,m) = 1 or (a,n) = 1 only (d) (a,m) = 1 and (a,n) = 1

Q111. If a = bq + r, then

(a) (a,r) = (b,r) (b) (a,b) = (b,r) (c) (a,b) = (a,r) (d) None of these

Q112. For any integer m, $(m^2 + 2)$ is not divisible by

(a) 4 (b) 6 (c) 11 (d) None of these

Q113. If a/b and b < a where $a \neq 0$,b are non – negative integers, then

(a) b is positive (b) b is negative (c) b is zero (d) none of these

Q114. If c/a and c/b then which one is true?

(a) $c/ma+nb$ m,n are integers (b) c > a

(c) c > b (d) None of these

Q115. If $\alpha \, and \, \beta$ are positive acute angles satisfying the equation

$3\sin^2\alpha + 2\sin^2\beta = 4 \; or \; 3\sin 2\alpha - 2\sin 2\beta = 0 \; then \; \alpha + 2\beta$

(a) $\frac{\pi}{2}$ (b) $2\pi/3$ (c) π (d) None of these

Q116. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3$, then $\cos\theta_1 + \cos\theta_2 + \cos\theta_3 =$

(a) 2 (b) 2 (c) 1 (d) 0

Q117. If $(1+\tan\alpha)(1+\tan 4\alpha) = 2, \alpha \in \left(0, \frac{\pi}{16}\right)$, then α is equal to

(a) $\frac{\pi}{20}$ (b) $\frac{\pi}{30}$ (c) $\frac{\pi}{40}$ (d) $\frac{\pi}{60}$

Q118. If m $\tan(\theta - 30^o)$ = n $\tan(\theta + 120^o)$, then $\frac{m+n}{m-n}$

(a) $\sin 2\theta$ (b) $2\cos 2\theta$ (c) $\tan 2\theta$ (d) None

Q119. The maximum value of $24\sin\theta + 7\cos\theta$ is

(a) 1 (b) 24 (c) 25 (d) 7

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Q120. $\cos 2\theta + 2\cos\theta$ is always

(a) Greater than $-\frac{3}{2}$ (b) Less than or equal to $\frac{3}{2}$

(c) Greater than or equal to $-\frac{3}{2}$ (d) None of these

Q121. $\sin 78^\circ - \sin 66^\circ - \sin 42^\circ + \sin 6^\circ =$

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) -1 (d) 1

Q122. The value of $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ$ is

(a) 4 (b) 2 (c) 3 (d) None of these

Q123. The value of $\frac{1}{\sin 10^o} - \frac{\sqrt{3}}{\cos 10^o} =$

(a) 1 (b) 4 (c) 2 (d) 0

Q124. In $\Delta ABC, \sin(B+C-A) + \sin(C+A-B) + \sin(A+B-C) =$

(a) 4sin A sin B sin C (b) 4 cos B cos B cos C

(c) 4sin A cos B cos C (d) 8 sin A sin B sin C

Q125. If $\tan\theta - \frac{4}{3}$ then $\sin\theta$ is

(a) $-\frac{4}{5}$ but not $\frac{4}{5}$ (b) $\frac{4}{5}$ but not $-\frac{4}{5}$

(c) $-\frac{4}{5}$ or $\frac{4}{5}$ (d) None of these

Q126. Which of the following number is rational?

(a) sin 15° (b) cos 15° (c) sin15° cos 15° (d) sin15° sos75°

Q127. If $\cos(\alpha+\beta) = \frac{4}{5}, \sin(\alpha-\beta) = \frac{5}{13}, 0 < \alpha, \beta < \frac{\pi}{4}$, then $\tan 2\alpha$ =

(a) $\frac{16}{63}$ (b) $\frac{56}{33}$ (c) $\frac{28}{33}$ (d) None of these

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Q128. $\underset{h\to 0}{Lt}\dfrac{\sqrt{x+h}-\sqrt{x}}{h}=$

(a) $\dfrac{1}{\sqrt{x}}$ (b) $\sqrt{x}$ (c) $2\sqrt{x}$ (d) $\dfrac{1}{2\sqrt{x}}$

Q129. $\underset{x\to\infty}{Lt}\dfrac{x^3-3x+2}{2x^3+x-3}=$

(a) 2 (b) $\dfrac{1}{2}$ (c) 0 (d) Dose not exist

Q130. If $y=\tan^{-1}\sqrt{\dfrac{1-\sin x}{1+\sin x}}$, then at x = $\dfrac{\pi}{6}$, $\dfrac{dy}{dx}$ is

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

Q131. If $x\geq 1$, then 2 $\tan^{-1}$x+ $\sin^{-1}\left(\dfrac{2x}{1+x^2}\right)$ is equal to

(a) 4 $\tan^{-1}$x (b) 0 (c) $\dfrac{\pi}{2}$ (d) π

Q132. The derivative of $\tan^{-1}\left\{\dfrac{1+x}{1-x}\right\}$ is

(a) $\dfrac{2}{1+x^2}$ (b) $\dfrac{1}{1+x^2}$ (c) $\dfrac{1+x^2}{1-x^2}$ (d) None of these

Q133. $\underset{x\to 0}{Lt}$ x log sin x =

(a) 1 (b) -1 (c) 0 (d) None of these

Q134. If x = a(t + sin t), y = a(1 – cos t) then $\dfrac{dy}{dx}=$

(a) $\tan\dfrac{t}{2}$ (b) $\cot\dfrac{t}{2}$ (c) $\sec\dfrac{t}{2}$ (d) $\cos ec\dfrac{t}{2}$

Q135. If $x=3\cos\theta-2\cos^2\theta, y=3\sin\theta-2\sin^3\theta$ then $\dfrac{dy}{dx}=$

(a) $\sin\theta$ (b) $\cos\theta$ (c) $\tan\theta$ (d) $\cot\theta$

Q136. The value of k which makes $f(x)=\begin{cases}\sin\left(\dfrac{1}{x}\right), & x\neq 0\\ k, & x=0\end{cases}$ continuous at x = 0 is

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(a) 8 (b) 1 (c) -1 (d) None of these

Q137. Let f(x) = x - |x – x^2|, x ∈ [-1,1]. Then the number of points at which f(x) discontinuous, is :

(a) 2 (b) 1 (c) 3 (d) None of these

Q138. If P(A) = 0.3, P(B) = 0.2 and P(C) = 0.1 and A, B, C are independent events, find the probability of occurrence of at least one of the three events A, B and C

(a) 0.453 (b) 0.496 (c) 0.354 (d) 0.396

Q139. The probabilities of problem being solved by two students are $\frac{1}{2}$ and $\frac{1}{3}$, respectively. The probability of the problem being solved is

(a) $\frac{2}{3}$ (b) $\frac{4}{3}$ (c) $\frac{1}{3}$ (d) 0.1

Q140. If $2^x + 2^y = 2^{x+y}$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{(2^x + 2^y)}{(2^x - 2^y)}$ (b) $\frac{2^x + 2^y}{1 + 2^{x+y}}$ (c) $2^{x-y}\frac{(2^y - 1)}{(1 - 2^x)}$ (d) $\frac{(2^{x+y} + 2^x)}{2^y}$

Q141. If $x^2 + y^2 = 1$, then

(a) yy' – 2y'^{2} + 1 = 0 (b) yy" – y'^{2} + 1 = 0

(c) yy' – y'^{2} – 1 = 0 (d0 yy' – 2(y')^2 + 1 = 0

Q142. If sin(x +y) = log(x + y), then $\frac{dy}{dx} =$

(a) 2 (b) -2 (c) 1 (d) -1

Q143. $\frac{d}{dx}(x^x)$ is

(a) xx^{x-1} (b) x^x log ex (c) x^x log x (d) None of these

Q144. If $y = (x^x)^x$, then $\frac{dy}{dx} =$

(a) xy(1 + logx) (b) xy(1 + 2logx) (c) $\frac{x}{y}(1 + \log x)$ (d) $\frac{x}{y}(1 + 2\log x)$

Q145. $\int \frac{dx}{\sin^2 \cos^2 x}$ is

(a) tan x – cot x (b) tan x + cot x

(c) tan x. cot x (d) tan x – cot 2x

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Q146. $\int x^2 e^{x^3}\cos(e^{x^3})dx =$

(a) $3\sin(e^{x^3})$ (b) $\sin(e^{x^3})$ (c) $\frac{1}{3}\sin(e^{x^3})$ (d) $-\frac{1}{3}\sin(e^{x^3})$

Q147. $\int \frac{\sqrt{x}}{\sqrt{a^3 - x^3}}dx$

(a) $\frac{2}{3}\left(\frac{x}{a}\right)^{\frac{3}{2}}$ (b) $\frac{2}{3}\sin^{-1}\left(\frac{x}{a}\right)^{\frac{3}{2}}$ (c) $\frac{2}{3}\cos^{-1}\left(\frac{x}{a}\right)^{\frac{3}{2}}$ (d) None of these

Q148. $\int_{-1}^{0} \frac{dx}{x^2 + 2x + 2} =$

(a) $\frac{\pi}{4}$ (b) 0 (c) $\frac{\pi}{2}$ (d) $-\frac{\pi}{4}$

Q149. $\int \frac{dx}{5 + 4\cos x} =$

(a) $\tan^{-1}\left[\frac{2}{3}\tan\left(\frac{x}{2}\right)\right]$ (b) $\frac{2}{3}\tan\left[\frac{1}{3}\tan\left(\frac{x}{2}\right)\right]$

(c) $\tan^{-1}\left[\tan^2\left(\frac{x}{2}\right)\right]$ (d) None of these

Q150. The contrapositive of $p \Rightarrow q$ is

(a) $\sim q \Rightarrow \sim p$ (b) $\sim p \Rightarrow \sim q$ (c) $q \Rightarrow p$ (d) $p \Rightarrow q$

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