**Subject :** PCM

**Topic :** Maths

**Q1 :** The length of the latus rectum of the parabola $(x+2)^2 = -14(y-5)$ is

**A** 7

**B** 14

**C** 21

**D** 28

**Q2 :** One of the foci of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$ is

**A** (3, 0)

**B** (4, 0)

**C** (5, 0)

**D** (9, 0)

**Q3 :** If the circles $x^2 + y^2 - 8x - 6y + c=0$ and $x^2 + y^2 - 2y + d = 0$ cut orthogonally, then c + d equals

**A** 6

**B** 4

**C** 2

**D** 0

**Q4 :** The radius of the circle which touches both axes and passes through the point (2, 1) can be

| | |
|---|---|
| **A** | 1 |
| **B** | 2 |
| **C** | 3 |
| **D** | 4 |

**Q5 :** The area of the triangle with vertices P(1, 2, 3), Q (4, 5, 6) and R(0, 0, 0) is

**A** $\sqrt{6}$

**B** $2\sqrt{6}$

**C** $3\sqrt{6}$

**D** $4\sqrt{6}$

**Q6 :** The unit vector in the direction of the vector $\overrightarrow{AB}$ if A = (-2, -1, 3) and B = (1, 1, 0) is $\alpha i + \beta j + \gamma k$, then is $\alpha + \beta$ is

**A** $\frac{3}{\sqrt{22}}$

**B** $\frac{5}{\sqrt{22}}$

**C** $\frac{-3}{\sqrt{22}}$

**D** $\frac{-5}{\sqrt{22}}$

**Q7 :** If $\begin{pmatrix} 3x-y & x+3y \\ 2x-z & 2y+z \end{pmatrix} = \begin{pmatrix} 7 & 9 \\ 5 & 5 \end{pmatrix}$, then x+y+z equals

**A** 3

**B** 6

**C** 9

**D** 12

**Q8 :** If the product *abc* = 1 , then the value of the determinant $\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix}$ is equal to

**A** 1

**B** 2

**C** 3

**D** 4

**Q9 :** If (x, y, z) is the solution of the equations
4x + y = 7,
3y + 4z = 5,
5x + 3z = 2,
then the value of x+y+z equals

**A** 8

**B** 6

**C** 3

**D** 0

**Q10 :** If $\begin{pmatrix} e & f \\ g & h \end{pmatrix}$ is the inverse of the matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ where *ad* - *bc* = 1 , then g equals

**A** c

**B** -c

**C** b

**D** -b

**Q11 :** If *f*: $\mathbb{R} \to \mathbb{R}$ is a function defined by $f(x) = x^2$ , then which of the following is true?

**A** f is 1-1 but not onto

**B** f is onto but not 1-1

**C** f is neither 1-1 nor onto

**D** f is both 1-1 and onto

**Q12 :** Consider the set A = {1, 2, 3} along with the relation R = {(1,1), (2,2), (1,2), (2,1) (3,3)}. Which of the following statements is true?

**A** The relation is symmetric but not transitive

**B** The relation is transitive but not symmetric

**C** The relation is neither symmetric nor transitive

**D** The relation is both symmetric and transitive

**Q13 :** let $z_1 = 1+i\sqrt{3}$ and $z_2 = 1+i$, then $\arg(z_1/z_2)$is

**A** $\pi/3$

**B** $\pi/4$

**C** $\pi/6$

**D** $\pi/12$

**Q14 :** Any non zero complex number *z* satisfying $|z-i| = |z+i|$ must lie on

**A** real axis

**B** imaginary axis

**C** unit circle

**D** the line parallel to real axis through $z = i$

**Q15 :** The value of $\left[\cos\frac{\pi}{8} + i\sin\frac{\pi}{8}\right]^4$ is

**A** $-i\pi$

**B** $i\pi$

**C** i

**D** -i

**Q16 :** If $\omega$ is the cube root of unity, then $(1 - \omega + \omega^2)^5 + (1 + \omega - \omega^2)^5$ equals

| | |
|---|---|
| **A** | 1 |

**B** 16

**C** 32

**D** 64

**Q17 :** The value of $\tan\left[\sin^{-1}\frac{5}{13} + \cot^{-1}\frac{4}{3}\right]$ is

**A** 26/11

**B** 56/33

**C** 63/41

**D** 65/43

**Q18 :** If $\tan^{-1} x + 2\cot^{-1} x = \frac{\pi}{3}$, then the value of x is

**A** $-\sqrt{3}$

**B** $-\sqrt{2}$

**C** $\sqrt{2}$

**D** $\sqrt{3}$

**Q19 :** Which of the following is not a solution of the following equation ?
$3\tan^2\theta - \sin\theta = 0$

**A** $n\pi$

**B** $n\frac{\pi}{2}$

**C** $n + (-1)^n\frac{\pi}{6}$

**D** 0

**Q20 :** If $\sqrt{\frac{y}{x}} + \sqrt{\frac{x}{y}} = 1$ , then $\frac{dy}{dx}$ equals

**A** $\sqrt{\frac{y}{x}}$

**B** $\sqrt{\frac{x}{y}}$

**C** y/x

**D** x/y

**Q21 :** If $x = 3t/(1 + t^3)$ and $y = 3t^2/(1+t^3)$ then $\frac{dy}{dx}$ at t=1 equals

**A** -6

**B** -1

**C** 1

**D** 6

**Q22 :** The equation of the normal to the curve given by $x^2 + 2x - 3y + 3 = 0$ at the point (1,2) is

**A** $3x + 4y - 11 = 0$

**B** $3x - 4y + 11 = 0$

**C** $-3x + 4y + 11 = 0$

**D** $3x - 4y - 11 = 0$

**Q23 :** If $f(x) = x^5 - 5x + 5$ then which of the following is TRUE ?

**A** f attains maximum at $x = 1$

**B** f attains minimum at $x = 1$

**C** f attains maximum at $x = 0$

**D** f attains minimum at $x = -1$

**Q24 :** The value of the integral $\int_0^{\frac{\pi}{2}} \log\tan\theta \, d\theta$ is

| | |
|---|---|
| **A** | 0 |
| **B** | 1 |

| | |
|---|---|
| **C** | $\frac{\pi}{2}$ |
| **D** | log2 |

**Q25 :** The area enclosed between the curve y = 11x - 24 - $x^2$ and the line y = x is

**A** 1/3

**B** 3/4

**C** 1

**D** 4/3

**Q26 :** The solution of the differential equation $\frac{dy}{dx}$ = $y^2$/x passing through the point (1, -1) is

**A** 1/y + logx =0

**B** 1/y - logx =0

**C** y + logx =0

**D** y - logx =0

**Q27 :** The differential equation $e^x \frac{dy}{dx}$ + 3y = $x^2$y is

**A** Separable and not linear

**B** Both separable and linear

**C** Linear and not separable

**D** Neither separable nor linear

**Q28 :** Let the mean of *n* observations is $\mu$ . If the first term is increased by 1 and second by 2 and so on, then the new mean is

| | |
|---|---|
| **A** | $\mu$ + n |
| **B** | $\mu$ + n/2 |
| **C** | + $\frac{n(n+1)}{2}$ |

**D** $\mu + \frac{(n+1)}{2}$

**Q29** The arithmetic mean and mode of a given data are 24 and 12 respectively. Then its median is :

**A** 25

**B** 18

**C** 20

**D** 22

**Q30** The probability of getting two heads out of 5 tosses of an unbiased coin is :

**A** 5/6

**B** 5/8

**C** 5/12

**D** 5/16

**Q31** Cards marked with numbers 2 to 105 are placed in a box and mixed. One card is chosen at random. The probability that the number on the card is less than 15 is :

**A** 1/8

**B** 1/9

**C** 7/8

**D** 8/9

**Q32** An urn contains 4 black, 5 white and 6 red balls. A ball is drawn at random. The probability that it is not black is :

**A** 4/15

**B** 9/15

**C** 11/15

**D** 13/15

**Q33** In a chess tournament, assume that your probability of winning a game is 0.3 against level 1 players, 0.4 against level 2 players and 0.5 against level 3 players. It is further assumed that among the players 50% are at level 1, 25 % are at level 2 and the remaining are at level 3. The probability of winning a game against a randomly chosen player is :

**A** 0.275

**B** 0.375

**C** 0.225

**D** 0.325

**Q34** A man repays a loan of Rs. 3250 by paying Rs. 20 in the first month and then increases the payment by Rs.15 every month. The number of months it takes to clear the loan is :

**A** 20

**B** 25

**C** 35

**D** 40

**Q35 :** The coefficient of $x^3$ in the expansion of $(x^2 - 2/x)^6$ is

**A** -160

**B** -80

**C** -40

**D** 0

**Q36 :** If the equation of the sphere through the circle $x^2 + y^2 + z^2 = 5$; $2x + 3y + 4z = 5$ and through the origin is $x^2 + y^2 + z^2 - 2x - 3y - 4z + C = 0$ then the value of C is

**A** 1

**B** -1

**C** 0

**D** 5

**Q37 :** The equation of the plane containing the lines $(x+1)/3 = (y+3)/5 = (z+5)/7$ and $(x-2)/1 = (y-4)/3 = (z-6)/5$

**A** x + 2y + z = 0

**B** x - 2y + z = 0

**C** x - 2y - z = 0

**D** x + 2y - z = 0

**Q38 :** Let $(n) = \frac{1}{\sqrt{n^2}} + \frac{1}{\sqrt{n^2 - 1}} + \cdots + \frac{1}{\sqrt{n^2 - (n-1)^2}}$. Then $\lim_{n \to \infty}$ *f*(n) equals

**A** $\pi$ /4

**B** $\pi$ /2

**C** /2

**D** 0

**Q39 :** A particle is acted upon by three forces in one plane, equal to 2,$2\sqrt{2}$ and 1 Kg forces respectively; the first is horizontal, the second acts at $45^o$ to the horizontal and the third is vertical. Then the angle $\theta$ which the resultant makes with the positive x-axis is

**A** $\tan^{-1}(3/4)$

**B** $\tan^{-1}(4/3)$

**C** $\tan^{-1}(\sqrt{2}/4)$

**D** $\tan^{-1}(1)$

**Q40 :** A block of mass 5 Kg starts to slide down a frictionless plane having an inclination of $25^{o}$ from rest at the top. The length of the incline is 2 metre. Then its speed when it reaches the bottom of the incline is

**A** 4.1 m/s

**B** 6.3 m/s

**C** 7.1 m/s

**D** 9.3 m/s