All India Science Teachers' Association, West Bengal

Preparatory Test for Entrance Examinations 2021

Class-XII, Paper-III (Mathematics)

Four probable answers are provided to each question. Select the best answer as correct answer. Each correct answer will be awarded +4 marks. Each wrong answer will be awarded -1 mark. In case of no response, 0 mark will be awarded.

1. $x=\cos\alpha+i\sin\alpha$, $y=\cos\beta+i\sin\beta$, $z=\cos\gamma+i\sin\gamma$ □□□ $x+y+z=0$ □□□ $(\frac{1}{x}+\frac{1}{y}+\frac{1}{z})$ □□ □□□ (If $x=\cos\alpha+i\sin\alpha$, $y=\cos\beta+i\sin\beta$, $z=\cos\gamma+i\sin\gamma$ and $x+y+z=0$ then value of $(\frac{1}{x}+\frac{1}{y}+\frac{1}{z})$ is)

a. xyz
b. 1
c. Re(x) +Re(y) +Re(z)
d. 0

2. $e^{\sin x}-e^{-\sin x}-4=0$ □□□, x □□ □□□□□□ □□□□□ □□□□□□ (If $e^{\sin x}-e^{-\sin x}-4=0$, number of real values of x is)

a. 0
b. 1
c. 2
d. 3

3. □□□□ □□□□□□□□□□ □□□□□ □□□□□ □□□□□□ $xy(x-5)(y-4)=0$। $x-3y=0$ □□ □□□□□□□□□ □□ □□□□□□□ □□□□□□□□□□□□ □□□□ □□□□ □□□□□□□□□□□ □□□□□□ □□□ □□□ □□□□□□ (The four side of a quadrilateral are given by $xy(x-5)(y-4)=0$.The equation of the line that divides the quadrilateral in two equal areas and parallel to $x-3y=0$ is)

a. $2x-6y-7=0$
b. $2x-6y+7=0$
c. $2x-6y+17=0$
d. $2x-6y-17=0$

4. $(\frac{1}{x}+x^{\log_{10} x})^5$ □□□□□□□□□ □□□□□ □□ 1000 □□□ x □□ □□□□□□□ □□□ (If the third term in the expansion $(\frac{1}{x}+x^{\log_{10} x})^5$ be 1000 then values of x is)

a. 100, $\frac{1}{\sqrt{10}}$
b. 300, $\frac{1}{\sqrt{10}}$
c. 10, $\frac{1}{\sqrt{10}}$

d. 500, $^{1}/_{\sqrt{10}}$

5. 2a+3b+6c=0 □□□ $ax^2+bx+c=0$ □□□□□□□□ □□□□ □□□ □□ □□□□□□□□ □□□□□ □□ □□ (If 2a+3b+6c=0, then one root of the equation $ax^2+bx+c=0$ lies in the interval)
a. 2<x<3
b. 1<x<2
c. 0<x<1
d. 1<x<3

6. $\int_0^{\pi} |\mathrm{S\,inx} + \mathrm{Cosx}|dx$ □□ □□□ (Value of $\int_0^{\pi} |\mathrm{S\,inx} + \mathrm{Cosx}|dx$ is)
a. 2
b. √2
c. 2√2
d. 4

7. $5^{\log_e x} = 50 - x^{\log_e 5}$ □□□, x □□ □□□ (If $5^{\log_e x} = 50 - x^{\log_e 5}$, then the value of x is)
a. 10
b. e
c. 100
d. e^2

8. f(x) = cos(sinx) + sin(cosx) □□□□□□□□□ □□□ □□□□□□ □□ (The fundamental period of the function f(x) = cos(sinx) + sin(cosx) is)
a. π
b. $\pi/2$
c. 2π
d. $2\pi/3$

9. $A=\{(x,y) \in R^2: y=e^x\}$ □□□ $B=\{(x,y) \in R^2: y=x\}$□□□ A∩B □□□ (If $A=\{(x,y) \in R^2: y=e^x\}$ and $B=\{(x,y) \in R^2: y=x\}$ A∩B will be)
a. ϕ
b. □□□□ □□□□□ □□□ (a singleton set)
c. □□□□ □□□□ □□□ (an infinite set)
d. {ϕ}

10. a, b, c □□□□□□□□ □□□□□□□□ □□□□□ □□□ a+b+c=bx □□□ (If a, b, c be in G. P. and a+b+c=bx, then)
a. -1<x<3

b. $-1 \leq x \leq 3$
c. $x>3$ $x<-1$ ($x>3$ or $x<-1$)
d. $x \geq 3$ $x \leq -1$ ($x \geq 3$ or $x \leq -1$)

11. 1, 3, 9 … 100 1, 3,7, … 100 (The number of terms which are equal in the two progressions 1, 3, 9 … to 100 terms and 1, 3,7, … to 100 terms is)
a. 3
b. 5
c. 2
d. 4

12. $0 \leq x \leq \pi/2$ $x^2 + \sin^2 x = 1$ (The number of roots of the equation $x^2 + \sin^2 x = 1$ in $0 \leq x \leq \pi/2$ is)
a. 0
b. 3
c. 2
d. 1

13. 100 1000, 3 5 1, 2, 3, 4, 5 (Numbers lying between 100 and 1000 and divisible by 3 and 5 are to be formed with the digits 1, 2, 3, 4, 5 without repetitions. Total number of such numbers is)
a. 24
b. 36
c. 12
d. 32

14. $\sin 7x + \cos 2x = -2$ ($0 \leq x \leq \pi/2$), (The least difference between the roots in the first quadrant ($0 \leq x \leq \pi/2$) of the equation $\sin 7x + \cos 2x = -2$ is)
a. 0
b. $2\pi/7$
c. $3\pi/7$
d. $\pi/14$

15. $f(x)= x\sqrt{e^{x(4-3x)}}$ (If $f(x)= x\sqrt{e^{x(4-3x)}}$, then)

a. $[1, \propto]$ □□□□□□□□ f(x) □□□□□□□□□ (f(x) is increasing in $[1, \propto]$)
b. $[-\frac{1}{3}, 1]$ □□□□□□□□ f(x) □□□□□□□□□ (f(x) is decreasing in $[-\frac{1}{3}, 1]$)
c. $[-\propto, -\frac{1}{3}]$ □□□□□□□□ f(x) □□□□□□□□□ (f(x) is increasing in $[-\propto, -\frac{1}{3}]$)
d. □□□□□ □□□□□□ □□ (none of the above)

16. $x^2+y^2+3x-4y+a=0$ □□□□□ $x^2+y^2-2x-2y+b=0$ □□□□□□□ □□□□□□□ □□□□□□□□□□□ □□□□ (If the circle $x^2+y^2+3x-4y+a=0$ bisects the circumference of the circle $x^2+y^2-2x-2y+b=0$, then)
a. $a+b+3=0$
b. $b-a+3=0$
c. $a-b+3=0$
d. $a+b-3=0$

17. $\frac{dy}{dx}+y.g'(x)=g(x)$ □□□□ □□□□□□□□ □□□□□□ □□□□□□ □□□ (The general solution of $\frac{dy}{dx}+y.g'(x)=g(x)$ is)
a. $ye^{g(x)} = (g(x)-1).e^{g(x)}+c$
b. $ye^{g(x)} = (g(x)+1).e^{g(x)}+c$
c. $ye^{g(x)} = g(x).e^{g(x)}+c$
d. $ye^{g(x)} = (g(x)-2).e^{g(x)}+c$

18. □□□ □□□, $\boldsymbol{a}=2\mathbf{i}+\mathbf{j}+\mathbf{k}$, $\boldsymbol{b}=\mathbf{i}+2\mathbf{j}-\mathbf{k}$ □□□ $\boldsymbol{c}$ □□□□□ □□□□□□□ □□□□□□। $|\boldsymbol{c}|=1$ □□□ $\boldsymbol{c}$ □ $\boldsymbol{a}$ □□□□□□ □□□□□ □□□□□ $\boldsymbol{c}$ □□□ (Let, three vectors $\boldsymbol{a}=2\mathbf{i}+\mathbf{j}+\mathbf{k}$, $\boldsymbol{b}=\mathbf{i}+2\mathbf{j}-\mathbf{k}$ and $\boldsymbol{c}$ are coplanar, where $|\boldsymbol{c}|=1$ and $\boldsymbol{c}$ is perpendicular to $\boldsymbol{a}$. Then $\boldsymbol{c}$ is)
a. $\frac{\mathbf{i}+\mathbf{j}+\mathbf{k}}{3}$
b. $\frac{-\mathbf{j}+\mathbf{k}}{\sqrt{2}}$
c. $\frac{\mathbf{j}+\mathbf{k}}{\sqrt{2}}$
d. $\frac{\mathbf{i}-2\mathbf{k}}{\sqrt{5}}$

19. $\int\frac{dx}{x^2+a}$ $(a<0)$ □□ □□□ (Value of $\int\frac{dx}{x^2+a}$ $(a<0)$ is)
a. $\frac{1}{\sqrt{a}} \tan^{-1}\frac{x}{\sqrt{a}}+c$
b. $\frac{1}{\sqrt{-a}} \tan^{-1}\frac{x}{\sqrt{-a}}+c$
c. $\frac{1}{2\sqrt{-a}} \log\left|\frac{x-\sqrt{-a}}{x+\sqrt{-a}}\right|+c$
d. $\frac{1}{2\sqrt{a}} \log\left|\frac{x-\sqrt{a}}{x+\sqrt{a}}\right|+c$

20. a_1x+b_1y+c_1=0 and a_2x+b_2y+c_2=0 □□□□□□□ □□□□ □□□□□□□□ □□□□ □□□□□□ □□□□□ □□□□□□□□□□ □□□□□□□□ □□□ □□□□ (If the lines a_1x+b_1y+c_1=0 and a_2x+b_2y+c_2=0 cut the coordinate axes in four concyclic points, then)

a. $a_1b_1= a_2b_2$
b. $a_1a_2= -b_1b_2$
c. $a_1b_2= -b_1a_2$
d. $a_1a_2= b_1b_2$

21. $\lim_{x\to\infty}\left(\frac{4x^2+1}{4x^2-1}\right)^{\frac{x^3}{1+x}}$ □□ □□□ (Value of $\lim_{x\to\infty}\left(\frac{4x^2+1}{4x^2-1}\right)^{\frac{x^3}{1+x}}$)

a. $\sqrt{e}$
b. 1
c. e^2
d. e

22. f □□□□ □□□□□□□□□□ □□□□□□□ □□□ f(1)=2। □□□ $\lim_{x\to 1}\int_1^{f(x)}\frac{2t}{x-1}dt$=4 □□ □□□ $f'(1)$ □□□ (Let f be a differentiable function and f(1)=2. If $\lim_{x\to 1}\int_1^{f(x)}\frac{2t}{x-1}dt$=4 then $f'(1)$ will be)

a. 1
b. 2
c. 4
d. $\frac{1}{2}$

23. y=$\frac{a^3x^2}{3}+\frac{a^2x}{2}-2a$ □□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□ □□□□□□□□□□ □□□□□□ □□□ (The locus of the vertices of the family of parabolas y=$\frac{a^3x^2}{3}+\frac{a^2x}{2}-2a$ is)

a. xy=$\frac{35}{16}$
b. xy=$\frac{36}{105}$
c. xy=$\frac{105}{64}$
d. xy=$\frac{3}{4}$

24. f(x) = $^{7-x}P_{x-3}$ □□□□□□□□□ □□□□□□ □□ (The range of the function f(x) = $^{7-x}P_{x-3}$ is)

a. {x:x∈N, x≤6}
b. {1,2,3}
c. {x:x∈N, x<6}
d. {1,2,3,4}

25. y=f(x) □□□□□□□□□ □□□□□□□□ x=2 □□□□□□□□ □□□□□□□□ □□□□□□□ □□□ (If the graph of the function y=f(x) be symmetric about the line x=2 then)

a. f(x)= –f(-x)
b. f(x+2) = f(x-2)
c. f(x)= f(-x)
d. f(2+x) = f(2-x)

26. □□□□□□□□ x^2=16y+2□□ □□□□ □□□□□□□□ □□□□ PSP'। □□□ $\overline{SP}$=16 □□, $\overline{SP'}$ □□ □□□ □□□ (In a parabola x^2=16y+2, PSP'(S being the focus of the parabola) is a focal cord. If $\overline{SP}$=16, $\overline{SP'}$ will be equal to)

a. $\frac{8}{3}$
b. 8
c. 16
d. $\frac{16}{3}$

27. $\frac{x^2}{4}+\frac{y^2}{1}$=1 □□□□□□□□□ □□□□□ □□□□□ □□□□□□□□ $x^2+\frac{y^2}{a^2}$=1 □□□□□□ □□□ □□□। □□□ a=b^2-10b+25 □□ □□□□□ (If the ellipse $\frac{x^2}{4}+\frac{y^2}{1}$=1 meets the curve $x^2+\frac{y^2}{a^2}$=1 in four distinct points and if a=b^2-10b+25, then)

a. b<4 □□ b>6 (b<4 or b>6)
b. b≤4, b≥6
c. 4< b< 6
d. 4≤ b≤ 6

28. $\lim_{n\to 0} tan\left(\frac{\pi}{4}+x\right)^{\frac{1}{x}}$ =

a. e
b. e^2
c. e^3
d. e^5

29. θ = α □□□□□□□□ □□□□□□□□□ □□□□□□ □□ (The Cartesian equation of θ = α is)

a. y = xsinα
b. y = cosα
c. y = xtanα
d. y = xcotα

30. □□□ □□□, P(1,2) □□□ Q(3,4) □□□□ □□□□□□। x-□□□□□□ □□□ R □□□ □□□□ □□□□□□ □□□□ $\overline{PR}+\overline{RQ}$ □□□□□□□□□ □□। R □□□□□□□ □□□□□□□□□ □□ (Let P(1,2) and

Q(3,4) are two points. The point R on the x-axis is such that $\overline{PR}$ + $\overline{RQ}$ is minimum. The coordinates of R are)

a. $(\frac{3}{5}, 0)$
b. $(\frac{5}{3}, 0)$
c. $(-\frac{3}{5}, 0)$
d. $(-\frac{5}{3}, 0)$

31. x>1 □□□ y = (x-1) – logx □□□□□□□□ □□ □□□□□□□□□ □□□□□ □□□ □□ □□ (For x>1, y = (x-1) – logx satisfies)

a. $\frac{e^{x-1}}{x}$>1
b. $\frac{x}{e^{x^2-1}}$>1
c. $\frac{x}{e^{1-x}}$ <1
d. $\frac{e^{x-1}}{x}$ <1

32. (2**i** +3**j** - 4**k**) □□□□□□□ □□□□□□□□□□□□□ □□□□ □□□□□□□□□□ □□□ (6**i** +3**j** - 4**k**) □□□□□□□□ □□□□□□□□□ □□□□ □□□□□□□□ (-1, 2, 6) □□□□□□ □□□□ □□□□□□ (The distance from the point (-1, 2, 6) to the straight line passing through the point with position vector (2**i** +3**j** - 4**k**) and parallel to the vector (6**i** +3**j** - 4**k**) is)

a. 6
b. 5
c. 8
d. 7

33. f(x) = $\frac{logx}{1+x}$ □□□ $\int_1^{\frac{1}{e}} f(x)dx + \int_1^{e} f(x)dx$□□ □□□ (If f(x) = $\frac{logx}{1+x}$, then $\int_1^{\frac{1}{e}} f(x)dx$ + $\int_1^{e} f(x)dx$ is equal to)

a. 0
b. $\frac{1}{2}$
c. $-\frac{1}{2}$
d. 1

34. n∈N □□□ □□ □□□□□□□ □□□□□□□ □□□□□□□□□□□ □□□□ $10^n+3.4^{n+2}+5$ □□□□□□□ □□□ □□ □□ (For n∈N, the greatest positive integer that divides $10^n+3.4^{n+2}+5$ is)

a. 23
b. 9
c. 207

d. 19

35. $\alpha=\cos\frac{4\pi}{3}+i\sin\frac{4\pi}{3}$ □□□ $(\frac{1+\alpha}{2})^{3n}$ □□ □□□ (If $\alpha=\cos\frac{4\pi}{3}+i\sin\frac{4\pi}{3}$, then $(\frac{1+\alpha}{2})^{3n}$ is equal to)

a. $(-1)^n$
b. $(-i)^n$
c. $\frac{1}{2^{3n}}$
d. $\frac{(-1)^n}{2^{3n}}$

36. $y^2+(x-\frac{1}{y})\frac{dy}{dx}=0$ □□□□ □□□□□□□□ □□□□□□ □□□□□□ (The general solution of the differential equation $y^2+(x-\frac{1}{y})\frac{dy}{dx}=0$ is)

a. $x=\frac{1}{y}+1+Ce^{\frac{1}{y}}$
b. $x=1-\frac{1}{y}+Ce^{\frac{-1}{y}}$
c. $x=1+\frac{1}{y}+Ce^{\frac{-1}{y}}$
d. $x=1-\frac{1}{y}+Ce^{\frac{1}{y}}$

37. $\int_{\frac{\pi}{4}}^{\frac{\pi}{3}}\frac{sinx}{x}dx$□□ □□□ (*Value of* $\int_{\frac{\pi}{4}}^{\frac{\pi}{3}}\frac{sinx}{x}dx$ is)

a. <0
b. $>\frac{\sqrt{2}}{6}$
c. $\leq\frac{\sqrt{2}}{6}$
d. 1

38. $\frac{cosx}{cosy}=\frac{a}{b}$ □□□, $a\tan x+b\tan y$ □□ □□□ □□□ (If $\frac{cosx}{cosy}=\frac{a}{b}$, then value of $a\tan x+b\tan y$ will be)

a. $(a+b)(\tan\frac{x}{2}+\tan\frac{y}{2})$
b. $(a+b)\tan\frac{x+y}{2}$
c. $(a+b)\cot\frac{x+y}{2}$
d. $(a+b)(\cot\frac{x}{2}+\cot\frac{y}{2})$

39. $\sum_{k=1}^{k=\propto}cot^{-1}(k^2+\frac{3}{4})$ □□ □□□ □□ (Value of $\sum_{k=1}^{k=\propto}cot^{-1}(k^2+\frac{3}{4})$ is)

a. $\frac{\pi}{2}$

b. $-\frac{\pi}{2}$
c. $cot^{-1}\frac{1}{2}$
d. $cot^{-1}2$

40. $\{f(x)\}^n=f(nx)\forall x$ □□□ $f'(x).f(nx)$ □□ □□□ (If $\{f(x)\}=f(nx)\forall x$, then $f'(x).f(nx)$ is equal to)
a. x^n
b. $n.x^{n-1}$
c. f(x)
d. $f(x).f'(nx)$

41. $\int x(x^x)^x(2\log x+1)dx$□□ □□□ ($Value\ of \int x(x^x)^x(2\log x+1)dx$ is)
a. $(x^x)^x$ +C
b. $\frac{(x^x)^x}{\log(x^x)}$ +C
c. $x^{x^2+1}.\log x$ +C

$d. (x^x)^x$+C

42. $a>0$ □□□ $y^2=4a(x+a)$ □ $y^2=-4a(x-a)$ □□□□□□□□ □□□□ □□□□□ □□□□□□□ □□□□□□□□□ (□□□□ □□□□) □□□ (The area (in sq. units) bounded by the curves $y^2=4a(x+a)$ and $y^2=-4a(x-a)$, $a>0$ is)
a. $\frac{2}{3}a^2$
b. $\frac{4}{3}a^2$
c. $\frac{8}{3}a^2$
d. $\frac{16}{3}a^2$

43. A □ B □□□ □□□□ □□□□ □□ $P(A\cup B)=\frac{3}{4}$, $P(A\cap B)=\frac{1}{4}$ □□□ $P(A^C)=\frac{2}{3}$ ।□□□□□ $P(A^C\cap B$ □□ □□□ □□□ (A and B are events such that $P(A\cup B)=\frac{3}{4}$, $P(A\cap B)=\frac{1}{4}$ and $P(A^C)=\frac{2}{3}$. Then the value of $P(A^C\cap B)$ is)
a. $\frac{7}{4}$
b. $\frac{3}{8}$
c. $\frac{5}{12}$
d. $\frac{5}{8}$

44. A= $\begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 5\alpha \\ 0 & 0 & 5 \end{bmatrix}$ □ $|A^2|$= 25 □□□ |α| □□ □□□ □□□ (If A= $\begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 5\alpha \\ 0 & 0 & 5 \end{bmatrix}$ and $|A^2|$= 25, then |α| will be equal to)

a. 25
b. 5
c. $\frac{1}{5}$
d. $\frac{1}{25}$

45. a □□ □□□ □□ □□□□□□□□□ □□□□□ cos2θ + $a$sinθ=2a-7 □□□□□□□□□ □□□□□□□□□□□□ □□□ □□ □□ (The equation cos2θ + $a$sinθ=2a-7 is solvable if the values of a lie in the interval)

a. [2,7]
b. [2,6]
c. [3,7]
d. [5,8]

46. $2^{1+|cosx|+cos^2x+|cosx|^3} \ldots \ldots = 4$ □□□□□□□□□ □□□□□□□ □□□□□□□ □□ (The general solutions of the equation $2^{1+|cosx|+cos^2x+|cosx|^3} \ldots \ldots = 4$ are given by)

a. n$\pi \pm \frac{2\pi}{3}$, n$\in I$
b. n$\pi \pm \frac{\pi}{3}$, n$\in I$
c. 2n$\pi \pm \frac{\pi}{3}$, n$\in I$
d. 2n$\pi \pm \frac{2\pi}{3}$, n$\in I$

47. □□□□ □□□□□□□□□□ □□□□□□□□□ □□□□□ □□□□□□□□□ □□□□□ □□□ □□□□□□ □□□□□ □□□ □□□ □□□□□ □□□□ □□□□□ □□□□□ □□□□ □□□□□ 90% □□□□□□□□□ □□□□ □□□□□ □□□□□ □□□□□□□ □□□ □□□□□□ □□□ □□□□ □□□□□ □□□ □□□ □□□□□□ □□□□ □□□□□□□□□ □□□ (In an entrance test there are multiple choice questions. Each question has four possible options of which one is correct. The probability that a student knows the correct answer is 90%. If he guesses the correct answer, then the probability that he was guessing is)

a. $\frac{37}{40}$
b. $\frac{36}{37}$
c. $\frac{1}{9}$
d. $\frac{1}{37}$

48. x+y+z=10 □□□□□□□□ □□□□□□□ □□□□□□ (x,y,z) (□□□□□□ x, y, z ∈ I^+), □□ □□□□□□ □□□ (The number of different solutions (x,y,z) of the equation x+y+z=10, where x, y, z ∈ I^+ is)

a. 66

b. ${}^{10}C_3 - {}^{10}C_2$

c. 10^3-10

d. 36

49. ***a***=2**i**+**j**-**k**, ***b***=**i**+2**j**+**k**, **c**=2**i**-**j**+3**k**, ***d***=3**i**-**j**+2**k** □□□, (**b**-**d**)x**c** □□□□□□□□ □□□ (**a**+**c**) □□□□□□□□ □□□□□□□□ □□□ (If ***a***=2**i**+**j**-**k**, ***b***=**i**+2**j**+**k**, **c**=2**i**-**j**+3**k**, ***d***=3**i**-**j**+2**k**, then the projection of (**a**+**c**) on (**b**-**d**)x**c** is)

a. √6

b. √5

c. √3

d. √2

50. $\int f(x).sinx.cosxdx = \frac{1}{2(b^2-a^2)}\log[f(x)] + c$ □□□, *f(x)* □□□ (If $\int f(x).sinx.cosxdx = \frac{1}{2(b^2-a^2)}\log[f(x)] + c$, then *f(x)* is)

a. $\frac{a^2}{b^2cos^2x+a^2sin^2x}$

b. $\frac{1}{b^2cos^2x+a^2sin^2x}$

c. $\frac{1}{2(b^2cos^2x+a^2sin^2x)}$

d. $\frac{a^2+b^2}{b^2cos^2x+a^2sin^2x}$

51. $\frac{2}{3}+\frac{8}{9}+\frac{26}{27}+\frac{80}{81}+$…….. □□□□□□□ □□□□□ n □□□□□□ □□□□ □□□□□□ S_n □□, □□□ $\lim_{n\to\infty}(n-S_n)$ □□ □□□ (If S_n denotes the sum of first n terms of the series $\frac{2}{3}+\frac{8}{9}+\frac{26}{27}+\frac{80}{81}$ +……..then $\lim_{n\to\infty}(n-S_n)$ is)

a. $\frac{1}{2}$

b. 0

c. 2

d. 1

52. $\frac{d^2y}{dx^2} + 8\frac{dy}{dx} + 16y = 0$ □□□□ □□□□□□□□ □□□□□□ □□□□□□ □□ (The general solution of the differential equation $\frac{d^2y}{dx^2} + 8\frac{dy}{dx} + 16y = 0$ is)

a. $(A+Bx)e^{5x}$
b. $(A+Bx^2)e^{4x}$
c. $(A+Bx^{-4})e^{-4x}$
d. $(A+Bx)e^{-4x}$

53. $(tan^{-1}x)^2 + (cot^{-1}x)^2 = \frac{5\pi^2}{8}$ □□□ x □□ □□□ □□□ (If $(tan^{-1}x)^2 + (cot^{-1}x)^2 = \frac{5\pi^2}{8}$, then x will be)
a. -1
b. 0
c. 1
d. $\frac{1}{2}$

54. a_1, a_2, a_3, a_4 □□□ a_5 □□□ □□□□□□ □□□□□□ □□ a_1, a_2, a_3 □□□□□□□ □□□□□□□□, a_2, a_3, a_4 □□□□□□□□ □□□□□□□□, a_3, a_4, a_5 □□□□□□ □□□□□□□□ □□□□ □□□□□ a_1, a_3, a_5□□□□□ (Let a_1, a_2, a_3, a_4 and a_5 be such that a_1, a_2, a_3 are in A.P. and a_2, a_3, a_4 are in G.P and a_3, a_4, a_5 are in H.P. then a_1, a_3, a_5 are in)
a. □□□□□□□ □□□□□□□□ (Arithmatic Progression)
b. □□□□□□ □□□□□□□□ (Harmonic Progression)
c. □□□□□□□□ □□□□□□□□ (Geometric Progression)
d. □□□□□ □□□□□□ □□ (none of the above)

55. □□ □□□□□ x+y=5 □□□□□□□□□ (-2,7) □□□□□□□□ □□□□□□ □□□ □□□ □□□□□□□ $x^2 + y^2 + 4x - 6y + 9 = 0$ □□□□□□□□ □□□ □□□ □□□ □□□□□□ □□ (The equation of the circle which touches the line x+y=5 at the point (-2,7) and cuts the circle $x^2 + y^2 + 4x - 6y + 9 = 0$ orthogonally, is)
a. $x^2 + y^2 + 7x + 11y + 38 = 0$
b. $x^2 + y^2 + 7x - 11y + 38 = 0$
c. $x^2 + y^2 + 7x - 11y - 38 = 0$
d. $x^2 + y^2 - 7x - 11y - 38 = 0$

56. $y^2 = 4(x+1)$ □□□□□□□□□□ □□□□□□□□ □□□ □□□□□□□ □□□□ □□□□□□□ x+2y=3 □□□□□□□□ □□□□□□□□ □□□□□□□□□□ □□ □□□□□□□□ □□□□□□□ □□□ □□ □□ (The mirror image of any point on the directrix of the parabola $y^2 = 4(x+1)$ with respect to the line x+2y=3 lies on)
a. 3x+4y-16=0
b. 3x+4y+16=0
c. 3x-4y+16=0
d. 3x-4y-16=0

57. $\mathbf{r}.(2\mathbf{i}-5\mathbf{j}-2\mathbf{k})=3$ □□□ $\mathbf{r}.(\mathbf{i}-2\mathbf{j}+3\mathbf{k})=7$ □□□□ □□□□ □□ □□□□□□□□ □□□□□□□□ □□□ □□□ □□□ □□□□□□□□□ □□□□□□ □□ (A vector parallel to the line of intersection of the planes $\mathbf{r}.(2\mathbf{i}-5\mathbf{j}-2\mathbf{k})=3$ and $\mathbf{r}.(\mathbf{i}-2\mathbf{j}+3\mathbf{k})=7$ is)

a. $19\mathbf{i}-8\mathbf{j}+\mathbf{k}=3$
b. $19\mathbf{i}-8\mathbf{j}-\mathbf{k}=3$
c. $19\mathbf{i}+8\mathbf{j}-\mathbf{k}=3$
d. $19\mathbf{i}+8\mathbf{j}+\mathbf{k}=3$

58. x>0 □□□ $x^{\frac{1}{x}}$ □□ □□□□□□□□ □□□ (The maximum value of $x^{\frac{1}{x}}$ (x>0) is)

a. $e^{\frac{1}{e}}$
b. $\sqrt{e}$
c. e
d. $\frac{1}{\sqrt{e}}$

59. x>0 □□□ $f(x)=1+(x-1)e^x$ □□□ (If $f(x)=1+(x-1)e^x$, then, for x>0)

a. $f(x) <0$
b. $f(x) >0$
c. $f(x) \leq 0$
d. $f(x) \geq 0$

60. f □□ □□□□□□ □□□□□□□ g □□□ □□□ $f'(x) = \frac{1}{1+x^3}$ □□□ $g'(x)$ □□ □□□ □□□ (If g be the inverse of f and $f'(x) = \frac{1}{1+x^3}$, then $g'(x)$ will be)

a. $1+3x^2$
b. $\frac{1}{1+[g(x)]^3}$
c. $\frac{1}{[g(x)]^3-1}$
d. $1+[g(x)]^3$