

## **ANSWER KEYS**

1. (3)	<b>2.</b> (2)	<b>3.</b> (3)	<b>4.</b> (1)	5. (4)	<b>6.</b> (4)	7. (4)	<b>8.</b> (1)	
<b>9.</b> (1)	<b>10.</b> (6)							

First find 
$$\alpha^2 + \beta^2$$
 in terms of  $\lambda$  ///  $\alpha + \beta = \lambda - 3$  &  $\alpha\beta = -\lambda$  /// mathongo // mathongo //

$$\alpha^2+\beta^2=(lpha+eta)^2-2$$
  $lphaeta=(\lambda-3)^2+2\lambda$  mg /// mathong /// mathong /// mathong /// mathong

Now expression is quadratic in terms of 
$$\lambda$$
.

It will be minimum at 
$$\lambda = \left(-\frac{b}{2a}\right) \Rightarrow \lambda = \left(-\frac{(-4)}{12}\right) \Rightarrow \lambda = 2$$
 mathongo m

(2)			

$$y_{\min} = -rac{D}{4a} = rac{-(16-36)}{4} = 5 \; ; ext{ at } \lambda = 2, \; y_{\min} = 5$$

$$y_{min}=-rac{D}{4a}=rac{-\left(16-36
ight)}{4}=5$$
 ; at  $\lambda=2,\ y_{min}=5$  ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///.



## Answer Keys and Solutions

2/	(2) athongo /// mathongo							
2.	(2)							
	According to the question, Let $\alpha$ is the common root of	///. mathongo						
		given equation,						
	Hence, $\frac{\alpha^2}{b_1c_2-b_2c_1} = \frac{\alpha}{a_2c_1-a_1c_2} = \frac{1}{a_1b_2-a_2c_1}$	$\frac{1}{1-a_2b_1}$ mathongo						
	Above formula is used to fir							
	$a_1x^2 + b_1x + c_1 = 0$ $a_2x^2 + b_2x + c_2 = 0$							
	Now comparing given equat	tions with above me	ntion	ed standard we	get,			
	$a_1=1,\ b_1=b,\ c_1=-1$							
	and $a_2 = 1, \ b_2 = 1, \ c_2 = b$							
	Now put the above values in	the given formula,	and v	we get,				
	$\frac{1}{b^2-(-1)} = \frac{\alpha}{-1-b} = \frac{1}{1-b}$	///. mathongo		mathongo				
	or $\alpha^2 = \frac{b^2+1}{1-b}$ (i) and $\alpha = \frac{b+1}{b-1}$ (ii)							
	Substitute the value of $\alpha$ in $\left(\frac{b+1}{b-1}\right)^2 = \frac{b^2+1}{1-b}$	equation (i), we get	, ///.					
	Solving further we get,							
	$b^2 + 2b + 1 = b^2 - b^3 + 1$ –							
	$3b = -b^3$ mathongo $b^2 = -3, b = 0$							
	Hence, $b=0,i\sqrt{3},\;-i\sqrt{3}$							
	(3) athongo /// mathongo							
	$2x^2-7x+1=0$ mathons $7\pm\sqrt{41}$ $\Rightarrow x=rac{7\pm\sqrt{41}}{4}$							
	: First equation has irration : Both the roots will be con							
	$\Rightarrow rac{a}{2} = rac{b}{-7} = rac{2}{1}$ math $\Rightarrow a = 4, \ b = -14$ and							
	$\Rightarrow a = 4, \ b = -14$							



## **Answer Kevs and Solutions**

4. (1) athongo /				
Given quation is	$x^3 - 12x^2 + 39x$	-28 = 0		

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 ///,  $mathongo$  ///,  $mathongo$ 

$$^{\prime\prime\prime}$$
 so,common difference =  $+3or-3$   $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$ 

5. (4) 
$$e^{\sin x} - e^{-\sin x} - 4 = 0$$

$$4\left(x^2+rac{1}{x^2}
ight)+16\left(x+rac{1}{x}
ight)-57=0$$
 // mathongo // mathon

$$y \Rightarrow 4y^2 + 16y - 65 = 0$$
 athongo /// mathongo /// matho

When, 
$$y=\frac{5}{2}$$
 mathongo /// mathongo // mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

When, 
$$y=-\frac{13}{2}$$
 mathong /// mathong

$$\Rightarrow 2x^2 + 13x + 2 = 0$$
 $\Rightarrow x = \frac{-13 \pm \sqrt{153}}{4}$  mathongo /// matho

7. (4) 
$$\alpha + \beta + \gamma = 0$$
,  $\alpha\beta + \beta\gamma + \gamma a = -5$ ,  $\alpha\beta\gamma = -4$ 

$$\alpha + \beta + \gamma - 3\alpha\beta\gamma = (\alpha + \beta + \gamma)(\alpha + \beta + \gamma - \alpha\beta - \beta\gamma - \gamma\alpha) = 0$$

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## Answer Keys and Solutions

Answer Keys and Solutions						JEE Main	Crash Course
8.' (1) athongo ///. mathongo ///.							
Since, $\alpha$ , $\beta$ , $\gamma$ are the roots of the equa							
$2x^3 - 3x^2 + 6x + 1 = 0$							
$\Rightarrow \alpha + \beta + \gamma = \frac{3}{2}(1)$							
$\Rightarrow \alpha\beta + \beta\gamma + \alpha\gamma = 3(2)$ $\Rightarrow \alpha\beta\gamma = \frac{-1}{2}$ (3)							
$\Rightarrow lphaeta\gamma=rac{-1}{2}.\dots$ (3)	On s	quari	ng Eq. (1), we	get			
$lpha^2+eta^2+\gamma^2+2(lphaeta+eta\gamma+\gammalpha)=rac{9}{4}$	Using e	equati	on (2), we get				
$lpha^2+eta^2+\gamma^2=rac{9}{4}-2 imes 3=rac{-15}{4}$	mathongo						
9. (1) Let $e^x = t \in (0, \infty)$							
Given equation Given equation							
$t^4 + t^3 - 4t^2 + t + 1 = 0$							
$t^2 + t - 4 + \frac{1}{t} + \frac{1}{t^2} = 0$ thongo							
$\left(t^2+rac{1}{t^2} ight)\!+\!\left(t+rac{1}{t} ight)\!-\!4=0$							
Let $t + \frac{1}{t} = \alpha$ mathongo ///							
$\left(lpha^2-2 ight)\!+\!lpha-4=0$							
/// $\alpha^2 + \alpha - 6 = 0$ /// mathongo ///							
$lpha^2+lpha-6=0$							
$lpha=-3, 2\Rightarrow lpha=2\Rightarrow e^x+e^{-x}=2$							
x = 0 only solutions							
10. (6) mathongo we have,							
$ \left(7 + 4\sqrt{3}\right)^{x^2 - 4x + 3} + \left(7 - 4\sqrt{3}\right)^{x^2 - 4x} $	$^{+3}=14$						
Put							
Put mathons $(7+4\sqrt{3})^{x^2-4x+3} = t$							
$\Rightarrow \left(rac{7+4\sqrt{3}}{7-4\sqrt{3}} imes\left(7-4\sqrt{3} ight) ight)^{x^2-4x+3}=t$							
$\Rightarrow \left(\frac{1}{x^2-4x+3}\right) = t$							
$(7-4\sqrt{3})$ $\Rightarrow \left(\frac{1}{7-4\sqrt{3}}\right)^{x^2-4x+3} = t$ $\Rightarrow \left(7-4\sqrt{3}\right)^{x^2-4x+3} = \frac{1}{t}$							
Thus, given equation becomes							
$t+rac{1}{t}=14$							
$\Rightarrow t^2 - 14t + 1 = 0$							
$egin{align*} \Rightarrow t^2 - 14t + 1 &= 0 \ \ \Rightarrow t &= rac{14 \pm \sqrt{\left(14\right)^2 - 4\left(1 ight)\left(1 ight)}}{2} &= 7 \pm 4\sqrt{3} \ \end{array}$							
/// Thus,hongo /// mathongo ///							
$x^2 - 4x + 3 = 1, -1$							
$\Rightarrow x=2,\ 2\pm\sqrt{2}$							