MATHS

BOOKS - EDUCART PUBLICATION

SAMPLE PAPER 7

Section A

1. If $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$ =x then the value of sin x is

A. $-\frac{\sqrt{3}}{2}$

B. $\frac{\sqrt{3}}{2}$

C. $-\frac{1}{2}$

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

Answer: B

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2. If the elements of a matrix A of order 2×3 are defined as $a_{ij} = \begin{cases} i+j & i=j \\ i-j & i \neq j \end{cases}$ then the

matrix A^T is :

A. $\begin{bmatrix} -2 & 1 & 2 \\ -1 & -4 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 1 \\ -1 & 4 \\ -2 & -1 \end{bmatrix}$

C. $\begin{bmatrix} 2 & -1 & -2 \\ 1 & 4 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 3 \\ 3 & 0 \\ 4 & 5 \end{bmatrix}$

Answer: B

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3. Let f :N $\rightarrow R$ be defined by f(x) $= x^2 + 1$.

Then the pre - image (s) of 17 are:

A. ± 4

B. -4

C. 4

D. Data insuficient

Answer: C

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4. If y = sin t and x = 2 t then $\frac{d^2y}{dx^2}$ =

A. $-\frac{1}{4}\sin t$

B. $-\sin t$

C. $\frac{1}{4}\cos t$

D. cos t

Answer: A

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5. The logarithmic function defined as f(x) =log x is strictly increasing in :

A. R

B. $[0, \infty)$

C. $(- \infty, 0)$

D. $(0, \infty)$

Answer: D

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6. If $A = \begin{bmatrix} 1 & -2 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ then A (adj A) =

A. $\begin{bmatrix} 1 & 7 & -9 \\ 2 & 3 & 4 \\ -1 & -1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 4 & -5 & 3 \\ -3 & -2 & 1 \\ 0 & 7 & 9 \end{bmatrix}$

C. $\begin{bmatrix} 8 & 0 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & 8 \end{bmatrix}$

D. $\begin{bmatrix} 0 & -1 & 3 \\ 0 & 4 & 7 \\ 0 & 0 & 2 \end{bmatrix}$

Answer: C

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7. Let A be the set of human beings in a town at a particular time.A relation R on set A is defined as R = { (x,y): x is younger than y } . Then R is

A. reflexive symmetric but not transitive.

B. symmetric transitive but not reflexive

C. an equivalence relation

D. neither reflexive nor symmetric nor transitive .

Answer: D

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8. Region represented by x $\geq 0, y \geq 0$ is

A. first quadrant

B. second quadrant

C. third quadrant

D. fourth quadrant

Answer: A

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9. The point (s) of local maxima and local minima of the funcation f(x) $= 3x^4 - 8x^3 + 12x^2 - 48x + 1$ are :

A. 2

B. ± 2

C. $2, -\sqrt{2}$

D. $-\sqrt{2}$

Answer: A

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10. If A = $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ then $A^2 - 3I$ =

A. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -1 & -1 \\ -1 & 1 & -1 \\ -1 & -1 & 1 \end{bmatrix}$

C. $\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$

D. $\begin{bmatrix} -1 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{bmatrix}$

Answer: D

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11. If the points (3,-2) , (x,2) and (8,8) are collinear then the value fo x is :

A. 2

B. 5

C. 4

D. 3

Answer: B

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12. If $\left[x\cos\left(\cot^{-1}x\right)+\sin\left(\cot^{-1}x\right)\right]^2=\frac{51}{50}$

then the positive value of x is

A. $\frac{1}{\sqrt{2}}$

B. $\frac{1}{5\sqrt{2}}$

C. $2\sqrt{2}$

D. $5\sqrt{2}$

Answer: B

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13. If $xy^2 = ax^2 + bxy + y^2$ then $\frac{dy}{dx}$ =

A. $\frac{2ax + by - y^2}{2xy - bx - 2y}$

B. $\frac{2x^2 + axy + y^2}{x^2 + y^2 + 2xy}$

C. $\frac{2ax + by + y^2}{2xy + bx - 2y}$

D. $\frac{ax - by - xy}{xy + x^2 - y^2}$

Answer: A

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14. If f(x) = $\frac{\sqrt{4+x}-2}{x}$ is continuous x=0 then the value of f(0) is

A. 0

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

C. $\frac{1}{4}$

D. not defined

Answer: C

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15. Which of the following is a corner point of the feasible region of system of linear inequations 2x + 3y $\leq 6, x + 4y \leq 4$ and x, y ≥ 0 ?

A. $(1, 0)$

B. $(1, 1)$

C. $(0, 3)$

D. $\left(\frac{12}{5}, \frac{2}{5}\right)$

Answer: D

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16. A relation R in set A = {1,2,3} is defined as R = { (1,1) , (1,2) , (2,2) , (2,1) , (2,3) } . Which of the following ordered pair shall be added to make it a symmetric relation ?

A. (3,3)

B. (1,3)

C. (3,2)

D. (3,1)

Answer: C

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17. The maximum profit that a company can make if the profit function is given by p(x) = $-18x^2 + 36x + 27$ is :

A. 25

B. 45

C. 49

D. 27

Answer: B

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18. If $a^b . b^a = 16$ then the value of $\frac{db}{da}$ at (2,2) is :

A. -1

B. 1

C. 2

D. -2

Answer: A

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19. If $\begin{bmatrix} 6-x & 4 \\ 3-x & 1 \end{bmatrix}$ is a singular matrix then the value of x is

A. -2

B. -1

C. 1

D. 2

Answer: D

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20. If the tangent to a curve y $= x^3 - x$ at x =2 is parallel to the line y = mx -19 then the value of m is

A. 11

B. $\frac{19}{2}$

C. 6

D. -19

Answer: B

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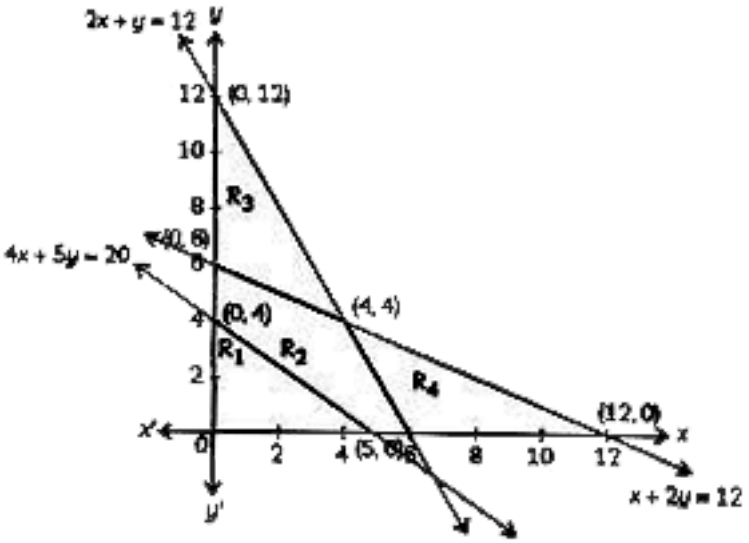
Section B

1. Which of the folowing should be the feasible region of the system of linear Inequalities x +

2y $\leq 12, 2x + y \leq 12, 4x + 5y \geq 20$ and $x, y \geq 0$?



A. R_1

B. R_2

C. R_3

D. R_4

Answer: A

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2. The function defined as f(x) = $2x^3 - 6x + 3$ is

A. strictly increasing in $(-\infty, -1) \cup (1, \infty)$ and strictly decreasing in (-1,1)

B. strictly increasing in (-1,1) and strictly decreasing in $(-\infty, -1) \cup (1, \infty)$.

C. strictly increasing in $(-\infty, -1) \cup [1, \infty)$ and strictly decreasing in [-1,1].

D. strictly increasing in [-1,1] and strictly decreasing in $(-\infty, -1) \cup [1, \infty)$

Answer: B

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3. If the function $f : \{1, 2, 3\} \to \{1, 2, 3\}$ is one one then it must be :

A. many -one

B. onto

C. into

D. reflexive

Answer: B

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4. The value of $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]$

A. $\frac{1}{\sqrt{2}}$

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

C. $\frac{\sqrt{3}}{2}$

D. 0

Answer: D

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5. If $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{17}\begin{bmatrix} 1 & 5 & 1 \\ 8 & 6 & -9 \\ 10 & -1 & -7 \end{bmatrix}\begin{bmatrix} 8 \\ 1 \\ 4 \end{bmatrix}$ then the value of xyz is

A. 0

B. 5

C. 8

D. 6

Answer: A

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6. If $y = \cos^{-1}\left[\frac{x+\sqrt{1-x^2}}{\sqrt{2}}\right]$ then $\frac{dy}{dx}$ =

A. $\frac{1}{\sqrt{1-x^2}}$

B. $\frac{-2x}{\left(-x\sqrt{1-x^2}\right)^2}$

C. $\frac{4x^2}{x+\sqrt{1-x^2}}$

D. $2\sqrt{1-x^2}$

Answer: C

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7. If the function y = m log x + $nx^2 + x$ has its critcal points at x = -1 and x =2 then the values of m and n respectively are

A. $2, \frac{1}{2}$

B. $-2, \frac{1}{2}$

C. $2, -\frac{1}{2}$

D. $-2, -\frac{1}{2}$

Answer: C

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8. If $y = \left(\cot^{-1} x\right)^2$ then

A.

$$\left(x^2+1\right)^2 \frac{d^2y}{dx^2} + x\left(x^2+1\right)\frac{dy}{dx} - 2 = 0$$

B.

$$\left(x^2+1\right)^2 \frac{d^2y}{dx^2} - 2x\left(x^2+1\right)\frac{dy}{dx} + 1 = 0$$

C.

$$\left(x^2+1\right)^2 \frac{d^2y}{dx^2} + 2x\left(x^2+1\right)\frac{dy}{dx} - 2 = 0$$

D. $\left(x^2+1\right)^2 \frac{d^2y}{dx^2} - x\left(x^2+1\right) + 2 = 0$

Answer: C

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9. If the function f : $A \rightarrow$ B is defined as f(x) $= \frac{x-2}{x-3}$ then the set A must be

A. R

B. R - {3}

C. R - {1}

D. R - { 2}

Answer: B

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10. If $A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ then BA if it exist is :

A. $\begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

B. $\begin{bmatrix} -3 & 1 & 8 \\ 2 & 0 & -8 \\ 6 & 1 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 6 & 0 & 0 \\ 0 & 6 & 0 \\ 0 & 0 & 6 \end{bmatrix}$

D. Does not exist

Answer: C

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11. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$ then $|\text{adj } A| =$

A. 121

B. 132

C. 178

D. 184

Answer: A

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12. The equation of normal to the curve y = $3x^2$ - 4x +7 at x = 1 is :

A. 2x - y +4 =0

B. 2x +y +8 =0

C. x +2y +13 =0

D. x -2y +11 =0

Answer: C

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13. If the corner points of a feasible region of system of linear inequalities are (15,20) (40,15) and (2,72) and the objective function is Z = 6x + 3y then $Z_{\max} - Z_{\min}$ =

A. 135

B. 78

C. 57

D. 101

Answer: A

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14. If the matrix $P = \begin{bmatrix} 7 & a & 4 \\ -1 & 3 & b \\ c & 6 & 2 \end{bmatrix}$ is a symmetric matrix then the respective values of a ,b,c are

A. 4,6,-1

B. 6,4,-1

C. $-1, 6,4$

D. 6,-1,4

Answer: C

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15. If the function f(x) = $\begin{cases} 10 & x \leq 3 \\ ax + b & 3 < x < 7 \\ 18 & x \geq 7 \end{cases}$

is continuous function then the value of a + b

is

A. 8

B. 6

C. 4

D. 2

Answer: B

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16. If y = e^x sin x then $\frac{d^2y}{dx^2}$ =

A. $2e^x$ sin x

B. $2e^x$ (sin x - cos x)

C. $2e^x(\cos x - \sin)$

D. $2e^x \cos x$

Answer: D

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17. The function f(t) = 4 $\sin^3 t - 6\sin^2$ t +12 sin t + 100 is strictly :

A. increasing in $\left(\pi, \frac{3\pi}{2}\right)$

B. decreasing in $\left(\frac{\pi}{2}, \pi\right)$

C. decreasing in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

D. decreaing in $\left[0, \frac{\pi}{2}\right]$

Answer: B

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18. The tangent to the curve $y = e^{2x}$ at the point (0,1) meets x - axis at :

A. $(0, 1)$

B. $\left(-\frac{1}{2}, 0\right)$

C. $(2, 0)$

D. $(0, 2)$

Answer: B

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19. The value of expression $\tan\left[\frac{1}{2}\cos^{-1}\frac{2}{\sqrt{5}}\right]$ is

A. $2\sqrt{5}$

B. $\sqrt{5}-2$

C. $\frac{\sqrt{5}-2}{2}$

D. $5-\sqrt{2}$

Answer: B

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20. The cofactor of the element 0 in the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ is

A. -19

B. 9

C. -9

D. 19

Answer: A

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Section C

1. Which of the following is correct regarding f(x) $=x^3$?

A. f(x) is neither continuous nor differentiable at x =3

B. f(x) is continuous but not differentiable at x =3

C. f(x) is continuous as well as differentiable at x =3

D. None of the given statements is correct .

Answer: C

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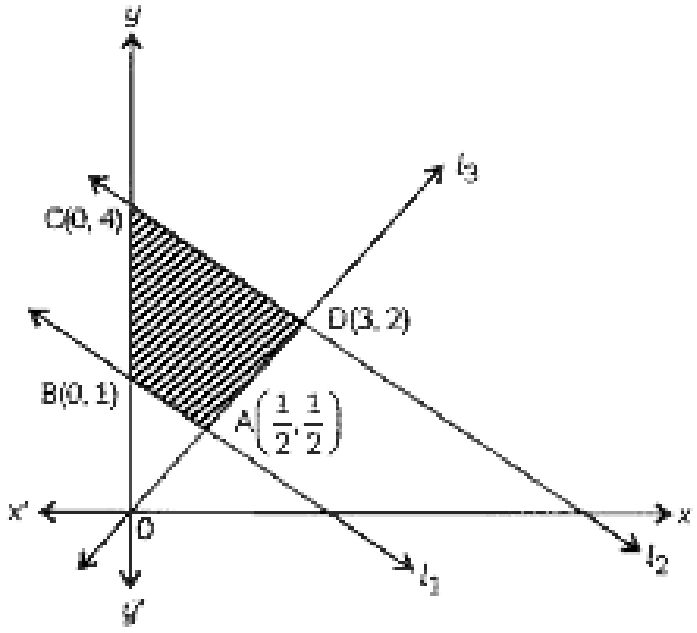
2. The feasible region of a system of linear inequalities is shown shaded in the following graph . If the objective function is Z = ax + by where a,b are constants and the maximum of Z occurs at points A and D then :



A. $3a = 5b$

B. $a = -\frac{3}{5}b$

C. $4a = 7b$

D. a = $-\frac{4}{7}$ b

Answer: B

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3. If $A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{bmatrix}$ then A^{-1} if it exists is :

A. $\frac{1}{67}\begin{bmatrix} -6 & 14 & -15 \\ 17 & 5 & 9 \\ 13 & -8 & -1 \end{bmatrix}$

B. $\frac{1}{67}\begin{bmatrix} 6 & -14 & 15 \\ -17 & -5 & -9 \\ -13 & 8 & 1 \end{bmatrix}$

C. $\frac{1}{67}\begin{bmatrix} -6 & 17 & 13 \\ 14 & 5 & -8 \\ -15 & 9 & -1 \end{bmatrix}$

D. Does not exist

Answer: C

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4. If the curves ay $+x^2 = 7$ and $x^3 = y$ cut orthogonally at (1,1) then the value of a is

A. 1

B. 0

C. -6

D. 6

Answer: D

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5. If A is a invertible matrix of order 4 then $\left|A^{-1}\right| =$

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6. A man has Rs 35000 which the want to invest in two different types of bonds say X and Y . The first bond pays 10% interest p.a and the second one pays 8% interest p.a. IF A a 1×2 matrix and B is a 2×1 matrix representing the ivestement and interest rate on each bond respectively then answer the

following questions .

If Rs 15000 is inversted in bond X then

A. A = Investment $\begin{bmatrix} X & Y \\ 15000 & 20000 \end{bmatrix}$

interest rate

$B = \begin{matrix} X \\ Y \end{matrix} \begin{bmatrix} 0.1 \\ 0.08 \end{bmatrix}$

B. A = Investment $\begin{bmatrix} X & Y \\ 15000 & 20000 \end{bmatrix}$

interest rate

$B = \begin{matrix} X \\ Y \end{matrix} \begin{bmatrix} 0.08 \\ 0.1 \end{bmatrix}$

C. $A = \begin{matrix} X \\ Y \end{matrix} \begin{bmatrix} 15000 \\ 20000 \end{bmatrix}, B \begin{bmatrix} = \begin{bmatrix} X & X \\ 0.1 & 0.8 \end{bmatrix} \end{bmatrix}$

Interest rate

D. $A = \begin{matrix} X \\ Y \end{matrix}\begin{bmatrix} \text{Investment} \\ 20000 \\ 150000 \end{bmatrix}, B\begin{bmatrix} = \begin{bmatrix} X & X \\ 0.08 & 0.1 \end{bmatrix} \end{bmatrix}$

Interest rate

Answer: A

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7. A man has Rs 35000 which the want to invest in two different types of bonds say X and Y . The first bond pays 10% interest p.a and the second one pays 8% interest p.a. IF A a 1×2 matrix and B is a 2×1 matrix

representing the ivestement and interest rate on each bond respectively then answer the following questions .

The total amount of interest received on both bonds is given by :

A. B'A

B. AB

C. A'B

D. BA

Answer: B

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8. A man has Rs 35000 which the want to invest in two different types of bonds say X and Y . The first bond pays 10% interest p.a and the second one pays 8% interest p.a. IF A a 1×2 matrix and B is a 2×1 matrix representing the ivestement and interest rate on each bond respectively then answer the following questions .

If Rs 15000 is invested in bond X then total amount of interset received on both bonds is :

A. Rs 1800

B. Rs 1400

C. Rs 2100

D. Rs 3100

Answer: D

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9. A man has Rs 35000 which the want to invest in two different types of bonds say X and Y . The first bond pays 10% interest p.a

and the second one pays 8% interest p.a. IF A a 1×2 matrix and B is a 2×1 matrix representing the ivestement and interest rate on each bond respectively then answer the following questions .

If the trust fund obtains an annual total intereset of Rs 3200 then the investment in two bonds is :

A. Rs 21000 in X, Rs 17000 in Y

B. Rs 17000 in X , Rs 21000 in Y

C. Rs 15000 in Y , Rs 20000 in Y

D. Rs 20000 in X , Rs 15000 in Y

Answer: D

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10. A man has Rs 35000 which the want to invest in two different types of bonds say X and Y . The first bond pays 10% interest p.a and the second one pays 8% interest p.a. IF A a 1×2 matrix and B is a 2×1 matrix representing the ivestement and interest rate

on each bond respectively then answer the following questions .

If the amount of interest received in bond X is Rs 500 then the amount of investment in bond Y is :

A. Rs 30000

B. Rs 20000

C. Rs 15000

D. Rs 10000

Answer: A

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