

National Testing Agency

Question Paper Name :	NEW 133 OLD 34 NEW ORDER1
Subject Name :	B TECH
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B E and B Tech

Group Number :	1
Group Id :	36669443
Group Maximum Duration :	0
Group Minimum Duration :	180
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	300
Is this Group for Examiner? :	No
Examiner permission :	Cant View
Show Progress Bar? :	No

Mathematics Section A

Section Id :	366694240
Section Number :	1

Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	366694240
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 1 Question Id : 3666944175 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

An organization awarded 48 medals in event ‘A’, 25 in event ‘B’ and 18 in event ‘C’. If these medals went to total 60 men and only five men got medals in all the three events, then, how many received medals in exactly two of three events?

Options :

36669412981. 15

36669412982. 9

36669412983. 10

36669412984. 21

Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum

Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

एक संस्था ने प्रतियोगिता A में 48 पदक, प्रतियोगिता B में 25 पदक तथा प्रतियोगिता C में 18 पदक दिए। यदि यह पदक कुल 60 पुरुषों को मिले तथा केवल पाँच पुरुषों को तीनों प्रतियोगिताओं में पदक मिले, तो कितने पुरुषों को ठीक दो प्रतियोगिताओं में पदक मिले?

Options :

36669412981. 15

36669412982. 9

36669412983. 10

36669412984. 21

Question Number : 2 Question Id : 3666944176 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum

Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let (α, β, γ) be the image of the point P (2, 3, 5) in the plane $2x + y - 3z = 6$. Then $\alpha + \beta + \gamma$ is equal to

Options :

36669412985. 12

36669412986. 10

36669412987. 9

36669412988. 5

Question Number : 2 Question Id : 3666944176 Question Type : MCQ Option Shuffling : Yes Is



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Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum

Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना बिंदु P (2, 3, 5) का समतल $2x + y - 3z = 6$ में प्रतिबिंब (α, β, γ) है। तो $\alpha + \beta + \gamma$ बराबर है:

Options :

36669412985. 12

36669412986. 10

36669412987. 9

36669412988. 5

Question Number : 3 Question Id : 3666944177 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum

Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Consider ellipses $E_k : kx^2 + ky^2 = 1, k = 1, 2, \dots, 20$. Let C_k be the circle which touches the four chords joining the end points (one on minor axis and another on major axis) of the ellipse E_k . If r_k is the radius of the circle C_k , then the value of

$$\sum_{k=1}^{20} \frac{1}{r_k^2} \text{ is}$$

Options :

36669412989. 2870

36669412990. 3080

36669412991. 3210

36669412992. 3320

Question Number : 3 Question Id : 3666944177 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

दीर्घवृत्तों $E_k: kx^2 + ky^2 = 1, k = 1, 2, \dots, 20$ का विचार कीजिए। माना C_k वह वृत्त है, जो दीर्घवृत्त E_k के अन्त्य बिंदुओं (एक लघु अक्ष पर तथा दूसरा दीर्घ अक्ष पर) को मिलाने वाली चार जीवाओं को स्पर्श करता है। यदि वृत्त C_k की त्रिज्या r_k है, तो $\sum_{k=1}^{20} \frac{1}{r_k^2}$ का मान है:

Options :

36669412989. 2870

36669412990. 3080

36669412991. 3210

36669412992. 3320

Question Number : 4 Question Id : 3666944178 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

The number of triplets (x, y, z) , where x, y, z are distinct non negative integers satisfying $x + y + z = 15$, is

Options :

36669412993. 136

36669412994. 114

36669412995. 92

36669412996. 80

Question Number : 4 Question Id : 3666944178 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

त्रिकों (x, y, z) , जहाँ x, y, z भिन्न ऋणोत्तर पूर्णांक हैं तथा $x + y + z = 15$ को संतुष्ट करते हैं, की संख्या है:

Options :

36669412993. 136

36669412994. 114

36669412995. 92

36669412996. 80

Question Number : 5 Question Id : 3666944179 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

The number of integral solutions x of $\log_{\left(x+\frac{7}{2}\right)}\left(\frac{x-7}{2x-3}\right)^2 \geq 0$ is

Options :

36669412997. 8

36669412998. 7

36669412999. 6

36669413000. 5

Question Number : 5 Question Id : 3666944179 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

$\log_{\left(x+\frac{7}{2}\right)}\left(\frac{x-7}{2x-3}\right)^2 \geq 0$ के पूर्णांक हलों x की संख्या है

Options :

36669412997. 8

36669412998. 7

36669412999. 6

36669413000. 5

Question Number : 6 Question Id : 3666944180 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let A be a 2×2 matrix with real entries such that $A' = \alpha A + I$, where $\alpha \in \mathbb{R} - \{-1, 1\}$. If $\det(A^2 - A) = 4$, then the sum of all possible values of α is equal to

Options :

36669413001. $\frac{5}{2}$

36669413002. $\frac{3}{2}$

36669413003. 2

36669413004. 0

Question Number : 6 Question Id : 3666944180 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना A वास्तविक अवयवों का एक 2×2 आव्यूह है जिसके लिए $A' = \alpha A + I$ है, $\alpha \in \mathbb{R} - \{-1, 1\}$ है। यदि $\det(A^2 - A) = 4$ है, तो α के सभी संभव मानों का योग बराबर है

Options :

36669413001. $\frac{5}{2}$

36669413002. $\frac{3}{2}$

36669413003. 2

36669413004. 0

Question Number : 7 Question Id : 3666944181 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let $f(x) = [x^2 - x] + |-x + [x]|$, where $x \in \mathbb{R}$ and $[t]$ denotes the greatest integer less than or equal to t . Then, f is

Options :

36669413005. not continuous at $x=0$ and $x=1$

36669413007. continuous at $x=0$, but not continuous at $x=1$

36669413008. continuous at $x=1$, but not continuous at $x=0$

Question Number : 7 Question Id : 3666944181 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum

Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना $f(x) = [x^2 - x] + |-x + [x]|$ है, जहाँ $x \in \mathbb{R}$ है तथा $[t]$ महत्तम पूर्णांक $\leq t$ है। तो f

Options :

36669413005. $x=0$ तथा $x=1$ पर संतत नहीं है

36669413006. $x=0$ तथा $x=1$ पर संतत है

36669413007. $x=0$ पर संतत है, परन्तु $x=1$ पर संतत नहीं है

36669413008. $x=1$ पर संतत है, परन्तु $x=0$ पर संतत नहीं है

Question Number : 8 Question Id : 3666944182 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum

Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

If equation of the plane that contains the point $(-2, 3, 5)$ and is perpendicular to each of the planes $2x + 4y + 5z = 8$ and $3x - 2y + 3z = 5$ is $\alpha x + \beta y + \gamma z + 97 = 0$ then $\alpha + \beta + \gamma =$

Options :

36669413009. 15

36669413010. 16

36669413011. 17

36669413012. 18

Question Number : 8 Question Id : 3666944182 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

यदि समतल, जिसमें बिंदु $(-2, 3, 5)$ स्थित है तथा जो दो समतलों $2x + 4y + 5z = 8$ तथा $3x - 2y + 3z = 5$ के लंबवत है, का समीकरण $\alpha x + \beta y + \gamma z + 97 = 0$ है, तो $\alpha + \beta + \gamma =$

Options :

36669413009. 15

36669413010. 16

36669413011. 17

36669413012. 18

Question Number : 9 Question Id : 3666944183 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Area of the region $\{(x, y) : x^2 + (y - 2)^2 \leq 4, x^2 \geq 2y\}$ is

Options :

36669413013

$$\pi - \frac{8}{3}$$

$$36669413014. \quad 2\pi - \frac{16}{3}$$

$$36669413015. \quad \pi + \frac{8}{3}$$

$$36669413016. \quad 2\pi + \frac{16}{3}$$

Question Number : 9 Question Id : 3666944183 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

क्षेत्र $\{(x,y) : x^2 + (y-2)^2 \leq 4, x^2 \geq 2y\}$ का क्षेत्रफल है

Options :

$$36669413013. \quad \pi - \frac{8}{3}$$

$$36669413014. \quad 2\pi - \frac{16}{3}$$

$$36669413015. \quad \pi + \frac{8}{3}$$

$$36669413016. \quad 2\pi + \frac{16}{3}$$

Question Number : 10 Question Id : 3666944184 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let $f:[2, 4] \rightarrow \mathbb{R}$ be a differentiable function such that

$$(x \log_e x) f'(x) + (\log_e x) f(x) + f(x) \geq 1, x \in [2, 4] \text{ with } f(2) = \frac{1}{2} \text{ and } f(4) = \frac{1}{4}.$$

Consider the following two statements :

$$(A) : f(x) \leq 1, \text{ for all } x \in [2, 4]$$

$$(B) : f(x) \geq \frac{1}{8}, \text{ for all } x \in [2, 4]$$

Then,

Options :

36669413017. Only statement (A) is true

36669413018. Only statement (B) is true

36669413019. Both the statements (A) and (B) are true

36669413020. Neither statement (A) nor statement (B) is true

Question Number : 10 Question Id : 3666944184 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना $f:[2, 4] \rightarrow \mathbb{R}$ एक अवकलनीय फलन है, जिसके लिए

$$(x \log_e x) f'(x) + (\log_e x) f(x) + f(x) \geq 1, x \in [2, 4], f(2) = \frac{1}{2} \text{ तथा } f(4) = \frac{1}{4} \text{ हैं।}$$

निम्न दो कथनों का विचार कीजिए :

(A) सभी $x \in [2, 4]$ के लिए $f(x) \leq 1$ है।

(B) सभी $x \in [2, 4]$ के लिए $f(x) \geq \frac{1}{8}$ है।

तो

Options :

36669413017. केवल कथन (A) सत्य है

36669413018. केवल कथन (B) सत्य है

36669413019. (A) तथा (B) दोनों कथन सत्य हैं

36669413020. न तो कथन (A) न ही कथन (B) सत्य है

Question Number : 11 Question Id : 3666944185 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let $\vec{a}$ be a non-zero vector parallel to the line of intersection of the two planes described by $\hat{i} + \hat{j}$, $\hat{i} + \hat{k}$ and $\hat{i} - \hat{j}$, $\hat{j} - \hat{k}$. If θ is the angle between the vector $\vec{a}$ and the vector $\vec{b} = 2\hat{i} - 2\hat{j} + \hat{k}$ and $\vec{a} \cdot \vec{b} = 6$, then the ordered pair $(\theta, |\vec{a} \times \vec{b}|)$ is equal to

Options :

36669413021. $\left(\frac{\pi}{4}, 3\sqrt{6}\right)$

36669413022

$$\left(\frac{\pi}{3}, 6\right)$$

$$36669413023. \left(\frac{\pi}{3}, 3\sqrt{6}\right)$$

$$36669413024. \left(\frac{\pi}{4}, 6\right)$$

Question Number : 11 Question Id : 3666944185 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना $\hat{i} + \hat{j}$, $\hat{i} + \hat{k}$ तथा $\hat{i} - \hat{j}$, $\hat{j} - \hat{k}$ द्वारा दिए गए दो समतलों की प्रतिच्छेदन रेखा के समांतर एक शून्येतर सदिश $\vec{a}$ है। यदि सदिश $\vec{a}$ तथा सदिश $\vec{b} = 2\hat{i} - 2\hat{j} + \hat{k}$ के बीच कोण θ है तथा $\vec{a} \cdot \vec{b} = 6$ है, तो क्रमित युग्म $(\theta, |\vec{a} \times \vec{b}|)$ बराबर है

Options :

$$36669413021. \left(\frac{\pi}{4}, 3\sqrt{6}\right)$$

$$36669413022. \left(\frac{\pi}{3}, 6\right)$$

$$36669413023. \left(\frac{\pi}{3}, 3\sqrt{6}\right)$$

$$36669413024. \left(\frac{\pi}{4}, 6\right)$$

Question Number : 12 Question Id : 3666944186 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

For any vector $\vec{a} = a_1 \hat{i} + a_2 \hat{j} + a_3 \hat{k}$, with $10 |a_i| < 1, i = 1, 2, 3$,

consider the following statements :

(A) : $\max\{|a_1|, |a_2|, |a_3|\} \leq |\vec{a}|$

(B) : $|\vec{a}| \leq 3 \max\{|a_1|, |a_2|, |a_3|\}$

Options :

36669413025. Only (A) is true

36669413026. Only (B) is true

36669413027. Both (A) and (B) are true

36669413028. Neither (A) nor (B) is true

Question Number : 12 Question Id : 3666944186 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

किसी भी सदिश $\vec{a} = a_1 \hat{i} + a_2 \hat{j} + a_3 \hat{k}$, $10 |a_i| < 1, i = 1, 2, 3$ के लिए निम्न कथनों का
विचार कीजिए:

(A) : $\max\{|a_1|, |a_2|, |a_3|\} \leq |\vec{a}|$ है

(B) : $|\vec{a}| \leq 3 \max\{|a_1|, |a_2|, |a_3|\}$ है

तो

Options :

36669413025. केवल (A) सत्य है

36669413026. केवल (B) सत्य है

36669413027. (A) तथा (B) दोनों सत्य हैं

36669413028. न तो (A) न ही (B) सत्य है

Question Number : 13 Question Id : 3666944187 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let $x_1, x_2, \dots, x_{100}$ be in an arithmetic progression, with $x_1=2$ and their mean equal to 200. If $y_i = i(x_i - i)$, $1 \leq i \leq 100$, then the mean of $y_1, y_2, \dots, y_{100}$ is

Options :

36669413029. 10051.50

36669413030. 10049.50

36669413031. 10101.50

36669413032. 10100

Question Number : 13 Question Id : 3666944187 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना $x_1, x_2, \dots, x_{100}$ एक समांतर श्रेणी में हैं, जिनका माध्य 200 है तथा $x_1 = 2$ है। यदि $y_i = i(x_i - i)$, $1 \leq i \leq 100$ हैं, तो $y_1, y_2, \dots, y_{100}$ का माध्य है

Options :

36669413029. 10051.50

36669413030. 10049.50

36669413031. 10101.50

36669413032. 10100

Question Number : 14 Question Id : 3666944188 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let w_1 be the point obtained by the rotation of $z_1 = 5 + 4i$ about the origin through a right angle in the anticlockwise direction, and w_2 be the point obtained by the rotation of $z_2 = 3 + 5i$ about the origin through a right angle in the clockwise direction. Then the principal argument of $w_1 - w_2$ is equal to

Options :

36669413033. $\pi - \tan^{-1} \frac{33}{5}$

36669413034. $-\pi + \tan^{-1} \frac{33}{5}$

36669413035. $\pi - \tan^{-1} \frac{8}{9}$

36669413036. $-\pi + \tan^{-1} \frac{8}{9}$

Question Number : 14 Question Id : 3666944188 Question Type : MCQ Option Shuffling : Yes Is
 Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
 Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना $z_1 = 5 + 4i$ को मूल बिंदु के सापेक्ष घड़ी की विपरीत दिशा में एक समकोण तक घुमाने पर बिंदु w_1 प्राप्त होता है तथा $z_2 = 3 + 5i$ को मूल बिंदु के सापेक्ष घड़ी की दिशा में एक समकोण तक घुमाने पर बिंदु w_2 प्राप्त होता है। तो $w_1 - w_2$ का मुख्य आयाम बराबर है

Options :

36669413033. $\pi - \tan^{-1} \frac{33}{5}$

36669413034. $-\pi + \tan^{-1} \frac{33}{5}$

36669413035. $\pi - \tan^{-1} \frac{8}{9}$

36669413036. $-\pi + \tan^{-1} \frac{8}{9}$

Question Number : 15 Question Id : 3666944189 Question Type : MCQ Option Shuffling : Yes Is
 Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
 Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

The value of the integral $\int_{-\log_e 2}^{\log_e 2} e^x \left(\log_e \left(e^x + \sqrt{1 + e^{2x}} \right) \right) dx$ is equal to

Options :

36669413037. $\log_e \left(\frac{(2 + \sqrt{5})^2}{\sqrt{1 + \sqrt{5}}} \right) + \frac{\sqrt{5}}{2}$

36669413038. $\log_e \left(\frac{\sqrt{2}(2+\sqrt{5})^2}{\sqrt{1+\sqrt{5}}} \right) - \frac{\sqrt{5}}{2}$

36669413039. $\log_e \left(\frac{2(2+\sqrt{5})}{\sqrt{1+\sqrt{5}}} \right) - \frac{\sqrt{5}}{2}$

36669413040. $\log_e \left(\frac{\sqrt{2}(3-\sqrt{5})^2}{\sqrt{1+\sqrt{5}}} \right) + \frac{\sqrt{5}}{2}$

Question Number : 15 Question Id : 3666944189 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

समाकलन $\int_{-\log_e 2}^{\log_e 2} e^x \left(\log_e \left(e^x + \sqrt{1+e^{2x}} \right) \right) dx$ का मान बराबर है

Options :

36669413037. $\log_e \left(\frac{(2+\sqrt{5})^2}{\sqrt{1+\sqrt{5}}} \right) + \frac{\sqrt{5}}{2}$

36669413038. $\log_e \left(\frac{\sqrt{2}(2+\sqrt{5})^2}{\sqrt{1+\sqrt{5}}} \right) - \frac{\sqrt{5}}{2}$

36669413039. $\log_e \left(\frac{2(2+\sqrt{5})}{\sqrt{1+\sqrt{5}}} \right) - \frac{\sqrt{5}}{2}$

36669413040.

$$\log_e \left(\frac{\sqrt{2}(3-\sqrt{5})^2}{\sqrt{1+\sqrt{5}}} \right) + \frac{\sqrt{5}}{2}$$

Question Number : 16 Question Id : 3666944190 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

The number of elements in the set

$$S = \left\{ \theta \in [0, 2\pi] : 3\cos^4 \theta - 5\cos^2 \theta - 2\sin^6 \theta + 2 = 0 \right\} \text{ is}$$

Options :

36669413041. 8

36669413042. 9

36669413043. 10

36669413044. 12

Question Number : 16 Question Id : 3666944190 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

समुच्चय $S = \left\{ \theta \in [0, 2\pi] : 3\cos^4 \theta - 5\cos^2 \theta - 2\sin^6 \theta + 2 = 0 \right\}$ में अवयवों की संख्या है

Options :

36669413041. 8

36669413042. 9

36669413044. 12

Question Number : 17 Question Id : 3666944191 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let $S = \{M = [a_{ij}], a_{ij} \in \{0, 1, 2\}, 1 \leq i, j \leq 2\}$ be a sample space and
 $A = \{M \in S : M \text{ is invertible}\}$ be an event. Then $P(A)$ is equal to

Options :

36669413045. $\frac{47}{81}$

36669413046. $\frac{16}{27}$

36669413047. $\frac{49}{81}$

36669413048. $\frac{50}{81}$

Question Number : 17 Question Id : 3666944191 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना $S = \{M = [a_{ij}], a_{ij} \in \{0, 1, 2\}, 1 \leq i, j \leq 2\}$ एक प्रतिदर्श समष्टि है तथा
 $A = \{M \in S : M \text{ व्युत्क्रमणीय है}\}$, एक घटना है। तो $P(A)$ बराबर है

Options :

$$36669413045. \frac{47}{81}$$

$$36669413046. \frac{16}{27}$$

$$36669413047. \frac{49}{81}$$

$$36669413048. \frac{50}{81}$$

Question Number : 18 Question Id : 3666944192 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let sets A and B have 5 elements each. Let the mean of the elements in sets A and B be 5 and 8 respectively and the variance of the elements in sets A and B be 12 and 20 respectively. A new set C of 10 elements is formed by subtracting 3 from each element of A and adding 2 to each element of B. Then the sum of the mean and variance of the elements of C is _____.

Options :

$$36669413049. 38$$

$$36669413050. 32$$

$$36669413051. 36$$

$$36669413052. 40$$

Question Number : 18 Question Id : 3666944192 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना समुच्चय A में 5 अवयव है तथा समुच्चय B में भी 5 अवयव हैं। माना समुच्चयों A तथा B के अवयवों के माध्य क्रमशः 5 तथा 8 है और समुच्चयों A तथा B के अवयवों के प्रसरण क्रमशः 12 तथा 20 है। A के प्रत्येक अवयव में से 3 घटा कर तथा B के प्रत्येक अवयव में 2 जोड़ कर 10 अवयवों का एक नया समुच्चय C बनाया जाता है। तो C के अवयवों के माध्य तथा प्रसरण का योग है :

Options :

36669413049. 38

36669413050. 32

36669413051. 36

36669413052. 40

Question Number : 19 Question Id : 3666944193 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let R be a rectangle given by the lines $x = 0$, $x = 2$, $y = 0$ and $y = 5$. Let $A(\alpha, 0)$ and $B(0, \beta)$, $\alpha \in [0, 2]$ and $\beta \in [0, 5]$, be such that the line segment AB divides the area of the rectangle R in the ratio 4:1. Then, the mid-point of AB lies on a

Options :

36669413053. straight line

36669413054. parabola

36669413055. hyberbola

36669413056. circle

Question Number : 19 Question Id : 3666944193 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना रेखाओं $x = 0$, $x = 2$, $y = 0$ तथा $y = 5$ द्वारा निर्मित आयत R है। माना $A(\alpha, 0)$ तथा $B(0, \beta)$, $\alpha \in [0, 2]$, $\beta \in [0, 5]$ इस प्रकार हैं कि रेखाखंड AB आयत R के क्षेत्रफल को 4:1 के अनुपात में बाँटती है। तो AB का मध्य बिंदु एक

Options :

36669413053. सरल रेखा पर है

36669413054. परवलय पर है

36669413055. अतिपरवलय पर है

36669413056. वृत्त पर है

Question Number : 20 Question Id : 3666944194 Question Type : MCQ Option Shuffling : Yes Is
Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum
Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let $y = y(x)$ be a solution curve of the differential equation.

$$(1 - x^2y^2) dx = ydx + xdy.$$

If the line $x = 1$ intersects the curve $y = y(x)$ at $y = 2$ and the line $x = 2$ intersects the curve $y = y(x)$ at $y = \alpha$, then a value of α is

Options :

36669413057. $\frac{3e^2}{2(3e^2 - 1)}$

36669413058.

$$\frac{1-3e^2}{2(3e^2+1)}$$

$$36669413059. \frac{1+3e^2}{2(3e^2-1)}$$

$$36669413060. \frac{3e^2}{2(3e^2+1)}$$

Question Number : 20 Question Id : 3666944194 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना अवकल समीकरण

$$(1 - x^2y^2) dx = ydx + xdy$$

का हल वक्र $y = y(x)$ है। यदि रेखा $x = 1$, वक्र $y = y(x)$ को $y = 2$ पर काटती है तथा रेखा $x = 2$, वक्र $y = y(x)$ को $y = \alpha$ पर काटती है, तो α का एक मान है

Options :

$$36669413057. \frac{3e^2}{2(3e^2-1)}$$

$$36669413058. \frac{1-3e^2}{2(3e^2+1)}$$

$$36669413059. \frac{1+3e^2}{2(3e^2-1)}$$

$$36669413060. \frac{3e^2}{2(3e^2+1)}$$

Mathematics Section B

Section Id :	366694241
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	366694241
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 21 Question Id : 3666944195 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

The mean of the coefficients of $x, x^2, \dots, x^7$ in the binomial expansion of $(2 + x)^9$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 21 Question Id : 3666944195 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

$(2 + x)^9$ के द्विपद प्रसार में $x, x^2, \dots, x^7$ के गुणांकों का माध्य _____ है ।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 22 Question Id : 3666944196 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let a line l pass through the origin and be perpendicular to the lines

$$l_1 : \vec{r} = (\hat{i} - 11\hat{j} - 7\hat{k}) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k}), \lambda \in \mathbb{R} \text{ and}$$

$$l_2 : \vec{r} = (-\hat{i} + \hat{k}) + \mu(2\hat{i} + 2\hat{j} + \hat{k}), \mu \in \mathbb{R}.$$

If P is the point of intersection of l and l_1 , and Q (α, β, γ) is the foot of perpendicular from P on l_2 , then $9(\alpha + \beta + \gamma)$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 22 Question Id : 3666944196 Question Type : SA Calculator : None

Correct Marks : 4 Wrong Marks : 1

माना एक रेखा l मूल बिंदु से होकर जाती है तथा रेखाओं

$$l_1 : \vec{r} = (\hat{i} - 11\hat{j} - 7\hat{k}) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k}), \lambda \in \mathbb{R},$$

$$l_2 : \vec{r} = (-\hat{i} + \hat{k}) + \mu(2\hat{i} + 2\hat{j} + \hat{k}), \mu \in \mathbb{R}$$

के लंबवत है। यदि l तथा l_1 का प्रतिच्छेदन बिंदु P है तथा P से l_2 पर लंब का पाद $Q(\alpha, \beta, \gamma)$ है, तो $9(\alpha + \beta + \gamma)$ बराबर _____ है।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 23 Question Id : 3666944197 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

The number of ordered triplets of the truth values of p , q and r such that the truth value of the statement $(p \vee q) \wedge (p \vee r) \Rightarrow (q \vee r)$ is True, is equal to _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 23 Question Id : 3666944197 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

p, q तथा r के सत्यमानों के क्रमित त्रिकों, जिनके लिए कथन $(p \vee q) \wedge (p \vee r) \Rightarrow (q \vee r)$ का सत्यमान True है, की संख्या बराबर _____ है।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 24 Question Id : 3666944198 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

If a and b are the roots of the equation $x^2 - 7x - 1 = 0$, then the value of $\frac{a^{21} + b^{21} + a^{17} + b^{17}}{a^{19} + b^{19}}$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 24 Question Id : 3666944198 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

यदि समीकरण $x^2 - 7x - 1 = 0$ के मूल a तथा b हैं, तो $\frac{a^{21} + b^{21} + a^{17} + b^{17}}{a^{19} + b^{19}}$ का मान बराबर _____ है।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 25 Question Id : 3666944199 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let $S = 109 + \frac{108}{5} + \frac{107}{5^2} + \dots + \frac{2}{5^{107}} + \frac{1}{5^{108}}$. Then the value of $(16S - (25)^{-54})$ is equal to _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 25 Question Id : 3666944199 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

माना $S = 109 + \frac{108}{5} + \frac{107}{5^2} + \dots + \frac{2}{5^{107}} + \frac{1}{5^{108}}$ है। तो $(16S - (25)^{-54})$ का मान बराबर _____ है।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 26 **Question Id :** 3666944200 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 4 **Wrong Marks :** 1

For $m, n > 0$, let $\alpha(m, n) = \int_0^2 t^m (1 + 3t)^n dt$. If $11\alpha(10, 6) + 18\alpha(11, 5) = p(14)^6$, then p is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 26 **Question Id :** 3666944200 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 4 **Wrong Marks :** 1

$m, n > 0$ के लिए माना $\alpha(m, n) = \int_0^2 t^m (1 + 3t)^n dt$ है। यदि

$11\alpha(10, 6) + 18\alpha(11, 5) = p(14)^6$ तो p बराबर _____ है।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 27 Question Id : 3666944201 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

The number of integral terms in the expansion of $\left(3^{\frac{1}{2}} + 5^{\frac{1}{4}}\right)^{680}$ is equal to

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 27 Question Id : 3666944201 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

$\left(3^{\frac{1}{2}} + 5^{\frac{1}{4}}\right)^{680}$ के प्रसार में पूर्णांक पदों की संख्या है _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 28 Question Id : 3666944202 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Wrong Marks : 1

Let $H_n : \frac{x^2}{1+n} - \frac{y^2}{3+n} = 1, n \in \mathbb{N}$. Let k be the smallest even value of n such that the eccentricity of H_k is a rational number. If l is the length of the latus rectum of H_k , then $21l$ is equal to _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 28 **Question Id :** 3666944202 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 4 **Wrong Marks :** 1

माना $H_n : \frac{x^2}{1+n} - \frac{y^2}{3+n} = 1, n \in \mathbb{N}$ हैं। माना k, n का वह न्यूनतम सम मान है जिसके लिए H_k की उत्केंद्रता एक परिमेय संख्या है। यदि H_k की नाभिलंब जीवा की लंबाई l है, तो $21l$ बराबर _____ है।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 29 **Question Id :** 3666944203 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 4 **Wrong Marks :** 1

Let $A = \begin{bmatrix} 0 & 1 & 2 \\ a & 0 & 3 \\ 1 & c & 0 \end{bmatrix}$, where $a, c \in \mathbb{R}$. If $A^3 = A$ and the positive value of a belongs

to the interval $(n-1, n]$, where $n \in \mathbb{N}$, then n is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 29 **Question Id :** 3666944203 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 4 **Wrong Marks :** 1

माना $A = \begin{bmatrix} 0 & 1 & 2 \\ a & 0 & 3 \\ 1 & c & 0 \end{bmatrix}$, $a, c \in \mathbb{R}$ है। यदि $A^3 = A$ है तथा a का घनात्मक मान अंतराल

$(n-1, n]$ में है, जहाँ $n \in \mathbb{N}$ है, तो n बराबर _____ है।

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 30 **Question Id :** 3666944204 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 4 **Wrong Marks :** 1

In an examination, 5 students have been allotted their seats as per their roll numbers. The number of ways, in which none of the students sits on the allotted seat, is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10

Question Number : 30 **Question Id :** 3666944204 **Question Type :** SA **Calculator :** None

Response Time : N.A **Think Time :** N.A **Minimum Instruction Time :** 0

Correct Marks : 4 **Wrong Marks :** 1

एक परीक्षा में 5 छात्रों को उनके रोल नंबर के अनुसार सीट दी गई है। उन तरीकों, जिनमें कोई भी छात्र दी गई सीट पर नहीं बैठता है, की संख्या है _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

10