

Notations :

- 1.Options shown in green color and with ✓ icon are correct.
- 2.Options shown in red color and with ✗ icon are incorrect.

Change Font Color :	No
Change Background Color :	No
Change Theme :	No
Help Button :	No
Show Reports :	No
Show Progress Bar :	No

Maths1

Section Id :	640653139213
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	16
Number of Questions to be attempted :	16
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653389931
Question Shuffling Allowed :	No

Question Number : 1 Question Id : 6406532136015 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : MATHEMATICS FOR DATA

SCIENCE I (COMPUTER BASED EXAM)"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?

CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406536957181. ✓ Yes

6406536957182. ✗ No

Question Number : 2 Question Id : 6406532136016 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

Instructions:

- There are some questions which have functions with discrete valued domains (such as day, month, year etc).
- For NAT type questions, enter only one right answer even if you get multiple answers for that particular question.
- Notations:
 - $\mathbb{R}$ = Set of real numbers
 - $\mathbb{Q}$ = Set of rational numbers
 - $\mathbb{Z}$ = Set of integers
 - $\mathbb{N}$ = Set of natural numbers
- The set of natural numbers includes 0.

Options :

6406536957183. ✓ Instructions has been mentioned above.

6406536957184. ✗ This Instructions is just for a reference & not for an evaluation.

Sub-Section Number : 2

Sub-Section Id : 640653389932

Question Shuffling Allowed : Yes

Question Number : 3 Question Id : 6406532136017 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Let f_1, f_2 be real-valued functions defined on a domain D . Let Z_1 and Z_2 denote the set of zeroes of f_1 and f_2 , respectively, i.e., for $i \in \{1, 2\}$,

$$Z_i = \{x \in D \mid f_i(x) = 0\}.$$

Which of the following is a valid domain for the real-valued function $\frac{f_1}{f_2}$?

Options :

6406536957185. ✖ D

6406536957186. ✖ $D \setminus Z_1$

6406536957187. ✔ $D \setminus Z_2$

6406536957188. ✖ $D \setminus (Z_1 \cap Z_2)$

Question Number : 4 Question Id : 6406532136021 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the real-valued functions f and g defined (on appropriate domains) by

$$f(x) = e^x, \quad g(x) = \sqrt{1-x}.$$

Which of the following is a valid domain for the composite real-valued function $g \circ f$?

Options :

6406536957198. ✖ $[1, \infty)$

6406536957199. ✔ $(-\infty, 0]$

6406536957200. ✖ $(-\infty, 1]$

6406536957201. ✖ $[0, 1]$

Sub-Section Number :

3

Sub-Section Id :

640653389933

Question Shuffling Allowed :

Yes

Question Number : 5 Question Id : 6406532136018 Question Type : SA Keyboard Layout :

Inscript

Correct Marks : 3

Question Label : Short Answer Question

Let the function $f(x)$ be defined as

$$f(x) = \begin{cases} ax + 2, & x < 1, \\ x^2 + b, & x \geq 1. \end{cases}$$

If the function $f(x)$ is continuous and differentiable at $x = 1$, find the numerical value of $2a + b$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

7

Question Number : 6 Question Id : 6406532136022 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 3

Question Label : Short Answer Question

Find the value of x for which of the following equation holds.

$$\frac{1}{\log_{x-1} e} + \frac{1}{\log_{x-2} e} = \log_e 6$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Sub-Section Number :

4

Sub-Section Id :

640653389934

Question Shuffling Allowed :

Yes

Question Number : 7 Question Id : 6406532136019 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the two quadratic functions

$$y_1 = x^2 - 4x + 1 \quad \text{and} \quad y_2 = x^2 - 6x - 3.$$

A quadratic function $f(x) = ax^2 + bx + c$ has its vertex at the intersection point of the graphs of y_1 and y_2 , its y -intercept is 2, and its axis of symmetry is parallel to the y -axis. What is the equation of $f(x)$?

Options :

6406536957190. ✓ $y = \frac{-11}{4}(x + 2)^2 + 13$.

6406536957191. ✗ $y = \frac{-11}{4}(x - 2)^2 + 13$

6406536957192. ✗ $y = \frac{11}{4}(x + 2)^2 + 13$

6406536957193. ✗ $y = \frac{-11}{4}(x + 2)^2 - 13$

Sub-Section Number :

5

Sub-Section Id :

640653389935

Question Shuffling Allowed :

Yes

Question Number : 8 Question Id : 6406532136020 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the polynomial function $f(x) = -(x + 1)^3(x - 1)^2(x - 3)^4$. Choose the correct statements from the following.

Options :

6406536957194. ✓ f has ⁴ turning points.

6406536957195. ✗ f has ⁸ turning points.

6406536957196. ✓ $f(x) \rightarrow \infty$ as $x \rightarrow -\infty$.

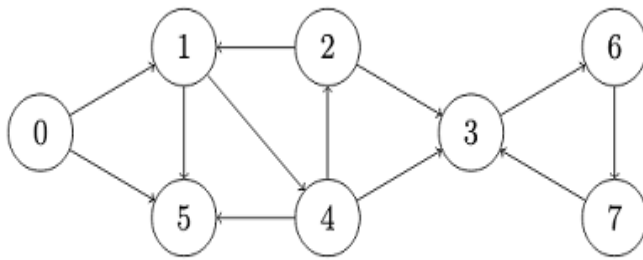
6406536957197. ✗ $f(x) \rightarrow \infty$ as $x \rightarrow \infty$

Question Number : 9 Question Id : 6406532136030 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the directed graph given below:



Suppose we perform BFS/DFS so that when we visit a vertex, we explore its unvisited neighbours in a random order. Which of the following options are correct?

Options :

6406536957213. ✓ If we perform Depth First Search at node 0, then one of the possible order in which the nodes will be visited is 05142367

6406536957214. ✓ If we perform Depth First Search at node 0, then one of the possible order in which the nodes will be visited is 01453672

6406536957215. ✓ If we perform Breadth First Search at node 0, then one of the possible order in which the nodes will be visited is 01542367

6406536957216. ✗ If we perform Depth First Search at node 0, then one of the possible order in which the nodes will be visited is 01543267

Sub-Section Number :

6

Sub-Section Id :

640653389936

Question Shuffling Allowed :

Yes

Question Number : 10 Question Id : 6406532136023 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 2

Question Label : Short Answer Question

Find $\lim_{n \rightarrow \infty} a_n$ for the sequence $\{a_n\}$ such that $a_n = \frac{3^{n+2} - 7n^3}{3^n + 6n^3}$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

9

Sub-Section Number :

7

Sub-Section Id :

640653389937

Question Shuffling Allowed :

Yes

Question Number : 11 Question Id : 6406532136024 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 5

Question Label : Short Answer Question

Let $f(x) = 28x^2 + \frac{1}{2}, 0 \leq x \leq 6$. The estimated area obtained by dividing the interval into 3 sub-intervals of equal length and the left end points of the sub-intervals for height of the rectangles is (in square units)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1123

Sub-Section Number :

8

Sub-Section Id :

640653389938

Question Shuffling Allowed :

Yes

Question Number : 12 Question Id : 6406532136025 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 4

Question Label : Short Answer Question

Find the number of solutions of the equation

$$9^x + 3^x - 6 = 0.$$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

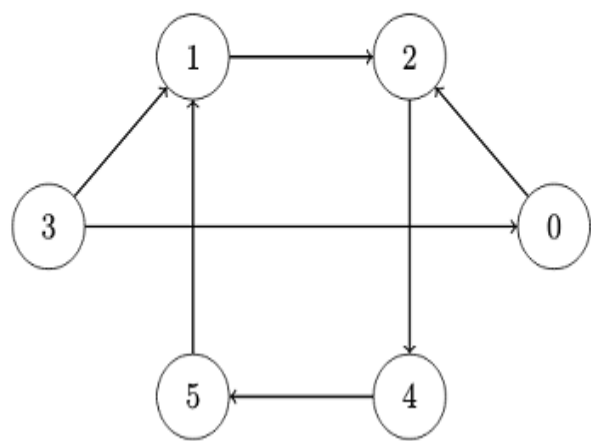
1

Question Number : 13 Question Id : 6406532136026 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 4

Question Label : Short Answer Question

A vertex u is called a root vertex of a directed graph if there is a directed path from u to every other vertex in the graph. Below is a directed graph G with the vertex set $\{0, 1, 2, 3, 4, 5\}$. Find the root vertex of G .



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :

3

Question Number : 14 **Question Id :** 6406532136027 **Question Type :** SA **Keyboard Layout :** Inscript
Correct Marks : 4

Question Label : Short Answer Question

Let $A^2 = A \times A$. What is the value of $2\alpha + \beta$?

$A =$

A	i	j	k	l	m
i	0	0	0	0	1
j	0	0	1	0	1
k	0	0	0	1	0
l	0	0	0	0	1
m	0	0	0	0	0

$A^2 =$

A^2	i	j	k	l	m
i	0	α	0	0	0
j	0	0	0	1	0
k	0	0	0	0	β
l	0	0	0	0	0
m	0	0	0	0	0

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

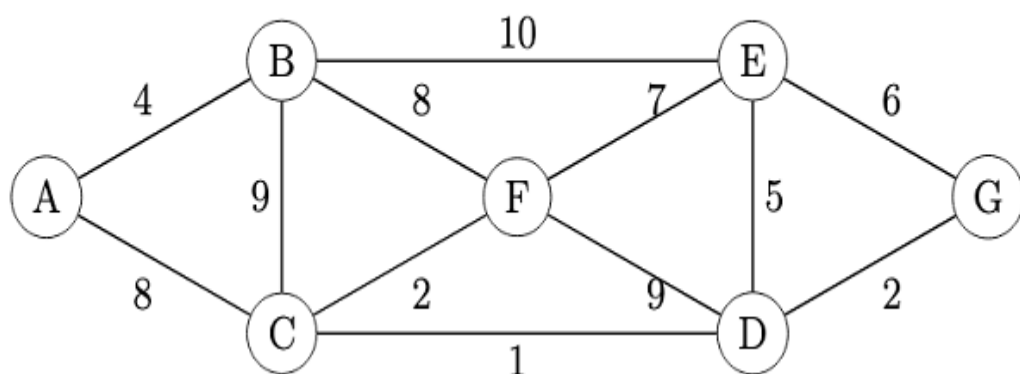
1

Question Number : 15 Question Id : 6406532136028 Question Type : SA Keyboard Layout : Inscript

Correct Marks : 4

Question Label : Short Answer Question

What is the weight of a minimum cost spanning tree of the given graph?



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

22

Sub-Section Number :

9

Sub-Section Id :

640653389939

Question Shuffling Allowed :

Yes

Question Number : 16 Question Id : 6406532136029 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are correct?

Options :

6406536957209. ✖ Dijkstra's algorithm can be used to find the minimum weight spanning tree in a graph.

6406536957210. ✔ Bellman-Ford algorithm can be used to indicate whether a graph has negative weight cycles or not.

6406536957211. ✓ Bellman-Ford algorithm provides a solution for the single source shortest path problem.

6406536957212. ✗ Floyd-Warshall algorithm is applicable for graphs that contain negative cycles.