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DEPARTMENT OF MATHEMATICS KHARAGPUR COLLEGE

CERTIFICATE COURSE ON "ADVANCEMENT OF MATHEMATICS FOR UG LEVEL" DEPARTMENT OF MATHEMATICS KHARAGPUR COLLEGE

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KHARAGPUR COLLEGE DEPARTMENT OF MATHEMATICS CERTIFICATE COURSE ON "ADVANCEMENT OF MATHEMATICS FOR UG LEVEL" <u>ATTENDANCE SHEET</u>

DEPARTMENT OF MATHEMATICS CERTIFICATE COURSE ON "ADVANCEMENT OF MATHEMATICS FOR UG LEVEL"

ATTENDANCE SHEET

KHARAGPUR COLLEGE

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# KHARAGPUR COLLEGE KHARAGPUR

#### ESTD.: 1949

P.O.– Inda, Kharagpur, Municipality– Kharagpur, Sub-Division– Kharagpur, P.S.– Kharagpur (T), Dist.– Paschim Medinipur, West Bengal, PIN– 721305.

DEPARTMENT OF MATHEMATICS, KHARAGPUR COLLEGE organised

Certificate Course on "ADVANCEMENT OF MATHEMATICS FOR UG LEVEL"



Dr. Bidyut Kumar Samanta, Principal, Kharagpur college, delivering his speech at the Inaugural session of the Certificate Course.



Prof. A. Mondal, Assistant Professor of Mathematics, taking class for the Certificate course.



Sri B. Mondal, SACT of Mathematics, taking class for the Certificate course

## **Certificate Course, Department of Mathematics, Kharagpur College**

TITLE: ADVANCEMENTS OF MATHEMATICS FOR UG LEVEL

# Date of Commencement of class: 24<sup>th</sup> May, 2023

# **Date of Completion: 12th June, 2023**

# **Duration: 30 Hours**

Sl. No.		Торіс	Resource Person	Theory/ Practical	Duration	Date & Time
1	Computational and optimization	Basic concepts of MATLAB Functions and Graph plotting in MATLAB, Solution of Differential equation (Both ODE and PDE) using MATLAB	Mr. Manideep Roy, Research Scholar, IIT Kharagpur	Practical	2 hours	24.05.2023 4:00 pm
1	using mathematical	Basic concepts of MATHEMATICA, Graph plotting etc.	Mr. Manideep Roy, Research Scholar, IIT Kharagpur	Practical	2 hours	26.05.2023 4:00 pm
	sonware	Solution of Linear Programming and Non- Linear Programming problem using LINGO	Mr. Manideep Roy, Research Scholar, IIT Kharagpur	Practical	2 hours	27.05.2023 4:00 pm
		Probability and concept of distribution functions	Prof. Anjana Mondal, Assistant Professor, KGP College	Theory	2 hours	29.05.2023 4:00 pm
2	Application of	Continuous and Discrete distributions	Prof. Anjana Mondal, Assistant Professor, Kharagpur College	Theory	2 hours	30.05.2023 4:00 pm
2	Statistics	Applications of probability distributions in real life	Prof. Anjana Mondal, Assistant Professor, Kharagpur College	Theory	2 hours	31.05.2023 4:00 pm
		Usefulness of statistics, some basic statistical tools	Prof. Anjana Mondal, Assistant Professor, Kharagpur College	Theory	2 hours	01.06.2023 4:00 pm
		Basic concept of fluid, Different types of fluid	Mr. Buddhadeb Mondal, State Aided College Teacher, Kharagpur College	Theory	2 hours	02.06.2023 4:00 pm
3	Fluid	Types of fluid flow and their application in real life problems	Mr. Buddhadeb Mondal, State Aided College Teacher, Kharagpur College	Theory	2 hours	05.06.2023 4:00 pm
5	Mechanics	Navier Stokes Equation and its applications	Mr. Buddhadeb Mondal, State Aided College Teacher, Kharagpur College	Theory	2 hours	06.06.2023 4:00 pm
		Reynolds number and its importance in fluid mechanics	Mr. Buddhadeb Mondal, State Aided College Teacher, Kharagpur College	Theory	2 hours	07.06.2023 4:00 pm

		Basic concept of Fuzzy Sets Fuzzy Number and their representation	Mr. KousikBhattacharya, State Aided College Teacher, Kharagpur College	Theory	2 hours	08.06.2023 4:00 pm
4	Fuzzy Mathematics	Fuzzy Number and their representation	Mr. Kousik Bhattacharya, State Aided College Teacher, Kharapur College	Theory	2 hours	09.06.2023 4:00 pm
		Application of fuzzy set theory in Supply Chain Modelling	Mr. Kousik Bhattacharya, State Aided College Teacher, Kharagpur College	Theory	2 hours	10.06.2023 4:00 pm
		Executive's Performance based Game theory	Mr. Kousik Bhattacharya, State Aided College Teacher, Kharagpur College	Theory	2 hours	12.06.2023 4:00 pm

Dr. Sangita Chakraborty Associate Professor & Head, Department of Mathematics, Coordinator Prof. Anjana Mondal Assistant Professor, Department of Mathematics, Co-coordinator

#### KHARAGPUR COLLEGE DEPARTMENT OF MATHEMATICS CERTIFICATE COURSE ON "ADVANCEMENT OF MATHEMATICS FOR UG LEVEL" DATE: From 24.05.2023 to 12.06.2023 Duration: 15 Days (30 Hours)

### **SYLLABUS**

#### Module 1. Computational and Optimization Techniques using Mathematical Software

- a. Basic concepts of MATLAB and MATHEMATICA
- b. Functions and graph plotting in MATLAB
- c. Solutions of differential equation (both ODE and PDE) using MATLAB and MATHEMATICA
- d. Solutions of Linear Programming and Non-Linear Programming problem using LINGO

#### Module 2. Application of Probability and Statistics

- a. Probability concept of distribution functions
- b. Discrete and continuous distribution functions
- c. Applications of probability distributions in real life
- d. Usefulness of statistics
- e. Some basic statistical tools

#### **Module 3. Fluid Mechanics**

- a. Basic concept of fluid
- b. Different types of fluid
- c. Types of fluid flow and their applications in real life problems
- d. Navier Stokes Equation and its applications
- e. Reynolds number and its importance in fluid mechanics

#### **Module 4. Fuzzy Mathematics**

- a. Basic concept of Fuzzy sets
- b. Fuzzy number and their representation
- c. Application of Fuzzy set theory in Supply Chain Modelling
- d. Application of Fuzzy set theory in Executive's Performance based Game

Dr. Sangita Chakraborty Associate Professor & Head, Department of Mathematics, Coordinator Prof. Anjana Mondal Assistant Professor, Department of Mathematics, Co-coordinator

# SUMMARY REPORT ON CERTIFICATE COURSE ENTITLED

### "ADVANCEMENT OF MATHEMATICS FOR UG LEVEL"

Organised by

Department of Mathematics, Kharagpur College

DATE: From 24.05.2023 to 12.06.2023 DURATION: 15 Days (30 Hours)

#### Coordinators: 1. Dr. Sangita Chakraborty, Associate Professor and Head, Department of Mathematics, Kharagpur College

#### 2. Dr. Anjana Mondal, Assistant Professor, Department of Mathematics, Kharagpur College

The certificate course is designed to provide UG students with a solid foundation in various mathematical concepts and techniques, which can lead to improve job prospects and career advancement opportunities. The course also provides a strong foundation for further study in mathematics and statistics or related fields.

This course offers introduction to a range of topics of pure mathematics, applied mathematics including Probability and Statistics, Fluid Mechanics, Fuzzy Mathematics, computational and optimization techniques using mathematical software: MATLAB programming, MATHEMATICA and LINGO. By completing the program, students will be equipping them to pursue a career in Mathematics and Statistics with confidence.

### Module 1: Computational and Optimization Techniques using Mathematical Software

#### Taught by: Mr. Monideep Roy, PMRF, Indian Institute of Technology, Kharagpur

For the analysis, manipulation, and visualization of data, MATLAB offers strong tools. Data cleansing, filtering, analytics, graphing, and interactive visualization creation are among the capabilities it provides. The development and implementation of algorithms is a common usage for MATLAB.

In the certificate course, students have learned to use MATLAB to plot various kinds of graphs. Solving ordinary and partial differential equations in MATLAB and MATHEMATICA makes the process easier and takes less time. Finding solutions to linear and non-linear programming problems manually is quite time-consuming and complicated. However, MATLAB makes this task easier. Students have quite benefited from learning the technique of using MATLAB and MATHEMATICA to solve complicated problems. Further, this will help students in their higher studies and research.

#### Module 2: Application of Probability and Statistics

#### Taught by: Dr. Anjana Mondal, Assistant Professor, Dept. of Mathematics, Kharagpur College

Probability theory has been motivated by real-life situations where an experiment is performed and the experimenter observes an outcome. Furthermore, the outcome may not be predicted with certainty. Probability is about interpreting and understanding these outcomes. It basically tells us how often different kinds ofoutcome will happen. As we all live in absolute randomness, its usefulness is wide. Like in, it is used in predicting weather forecast, to estimate potential customers that will be more likely to react positively to specific campaigns, based on their consumption patterns, to determine the best sports strategies for games and competitions, in analyzing insurance policies to determine which plans are best for customers and what deductible amounts they need.

It is not possible to draw reliable conclusions about real behaviour of a random variable on the basis of what we have discovered in our analysis. However, there is a way of generalizing the results of our limited analysis on random variables to broader behaviours, which help us to save time, money and reach more confident results. The way is to use proper probability distribution according to our situation. Lots of probability distribution models exist for different situations, and the key point that we have to select the right one that fits our data and helps us to explain what we want to get.

For example, Binomial distribution can answer what is the probability of getting three defective items in a batch of 100, two flue infections over 20 years, certain number ofside effects from a medicine, certain number of fraudulent transactions in a givenday. Geometric distribution can be used to know the probability that a banker will meet with less than 10 people before encountering someone who is filing bankruptcy, a company can go 5 weeks or longer without experiencing a network failure. Call centers use the Poisson distribution to model the number of expected calls per hour that they will receive, to find the probability that a restaurant willreceive more than a certain number of customers.

The most important probability distribution in Statistics is normal distribution. It is used in technical stock market analysis and other type of analyses, like heights, weights collected form a unbiased sample. Exponential distribution can be used in finding the probability that the time between earthquake occurrences, time between customers, time between geyser eruptions is some specific value. The Gamma distribution is used to model the time in between incoming calls at a call center alongwith the expected number of calls. There are several other applications of probability distributions in real life.

#### Module 3: Fluid Mechanics

#### Taught by: Mr. Buddhadeb Mondal, SACT, Dept. of Mathematics, Kharagpur College

Fluid mechanics, the branch of science that deals with the study of fluids (liquids and gases) in a state of rest or motion is an important subject of Civil, Mechanical and Chemical Engineering. Its various branches are fluid statics, fluid kinematics and fluid dynamics.

### Impact of fluid mechanics:

- I. **Food processing:** Fluid mechanics is important in the food industry for processing and packaging food products. Students are used fluid dynamics concept in feature to optimize the design of equipment such as mixers, pumps, and conveyors to ensure that food is processed safely and efficiently.
- II. Water supply and Treatment: Plumbing systems in our homes and buildings depend on fluid mechanics. Using fluid dynamics concept the flow of water through pipes, valves, and faucets can be analyzed by the students to ensure that the system is efficient and safe.
- III. Water sports: Activities such as swimming, diving, and water polo all are depend on fluid mechanics principles. Students try to making a athletes in water sports, use fluid dynamics to optimize their movements and equipment to increase speed and efficiency. For example, swimmers use techniques such as streamlining and drag reduction to improve their speed and efficiency in the water.
- IV. Air Travel: Fluid mechanics plays a significant role in the design and operation of airplanes. The study of aerodynamics, a branch of fluid mechanics, helps engineers optimize the shape and size of wings and other aircraft components to improve fuel efficiency and performance. In the context, this is motivated to students to make a aerospace engineer in future.

Overall, fluid mechanics is a fundamental field of study that has a significant impact on our daily lives.

### Module 4: Fuzzy Mathematics

#### Taught by: Dr. Kousik Bhattacharya, SACT, Dept. of Mathematics, Kharagpur College

Fuzzy logic has a significant role to formulate models of different types of real-world problems. This is not the precise rules of the logic itself, but rather the use of qualitative statements to produce a quantitative result. The quantity that should be computed for the problem depends upon various parameters; Most of these parameters could be characterized as follows:

- i) Parameter values and relations between them are uncertain and imprecise. Their estimation is often based on the subjective beliefs of decision maker.
- ii) It is difficult to measure them, either because there is no unit of measurement or there is no quantitative criterion for representing their values.
- iii) The knowledge available about their values and relations is incomplete.
- iv) Some of them are vaguely and unclearly defined.

Fuzzy membership functions are often used in applications, because it models linguistic terms about, more or less, approximately quite well and in a natural way, and it also simplifies the operations on fuzzy numbers. Triangular fuzzy number are determined by three values [1, m, u], where I represents the lower bound, m the mean value and u the upper bound of a fuzzy number. The membership degrees are 0 for points I and u, and it reaches 1 for m. The larger the difference u-l, the greater the uncertainty in the represented data. Boundaries are subjective in nature, and are input by the user of the system.

#### **Department of Mathematics \*\*\* Kharagpur College Question Paper for Certificate Course on**

"Advancements of Mathematics for UG Level"

MCQ Type Questions: Full Marks-20 : Time- 1 Hour : Date of Exam- 12th June, 2023

- What is the output of the following code in MATLAB? 1. p = 1:5;  $q = p.^3$ 

  - a. [1 125]
  - b. [1 2 3 4 5]
  - c. [1 8 27 64 125]
  - d. [125 64 27 8 1]
- 2. A matrix of 1's of order 3x2 can be obtained in MATLAB using
  - a. Zeros(3,2)
  - b. Ones(3,2)
  - c. ones(3,2)
  - d. rand(3,2)

3.

- Let  $A = \begin{pmatrix} 1 & 3 & 4 \\ 4 & 8 & 9 \end{pmatrix}$ . The command for building this matrix is:
  - 5 6 a. A=[1 4 5;3 8 6;4 9 2]
  - b. A=[1 3 4;4 8 9;5 6 2]
  - c. A=[1 3 4; 1 4 5;6 8 9 2]
  - d. A=[1 3 4;4 8 10;5 6 2]

Command for getting a submatrix of  $B = \begin{pmatrix} 3 & 4 \\ 6 & 2 \end{pmatrix}$  of the matrix A is 4.

- a. B=A(2:3;2:3)
- b. B=A(1:3:1:2)
- c. B=A(1:2;1:2)
- d. B=A(1:3;2:3)
- Let V = (1,2,3,4,5,6,7,8,9,10). How to find product of the elements of V 5.
  - a. V=1:10;sum(V)
  - b. V=1:2:10;prod(V)
  - c. V=1:10;prod(V)
  - d. V=1:1:10;multi(V)
- The probability of any event is 6.
  - is greater than 1 a.
  - lies between 0 and 1 b.
  - may be any real number c.
  - none of these. d.
- 7. A coin is tossed three times in succession, the number of sample points in the sample space is
  - a. 6 8
  - b.
  - 3 c.
  - 16 d.
- A number is chosen at random from first 100 natural numbers. The probability of the chosen number being 8. multiple of 8 is
  - a. 7/12
  - 31/25b.
  - c. 7/10
  - d. 3/25
- 9. The range of a random variable X is
  - $0 < X < \infty$ a.
  - $-\infty < X < 0$ b.
  - $-\infty < X < \infty$ c.
  - -1 < X < 1d.
- If f(x) be any probability density function, then a.  $f(x) \ge 0$  and  $\int_{-\infty}^{\infty} f(x) dx = 1$ . b. f(x) < 0 and  $\int_{-\infty}^{\infty} f(x) dx = 1$ . 10.

- c. f(x) > 0 and  $\int_{-\infty}^{\infty} f(x)dx = 0$ . d. f(x) > 0 and  $\int_{-\infty}^{\infty} f(x)dx = 1$ . Let  $f(x) = \begin{cases} kx(1-x), & 0 < x \le 1\\ 0, & elsewhere \end{cases}$ . The value of k for which f(x) defines a probability density function 11. 0
  - a.
  - 6 b. 4
  - c.
  - 5 d.
- 12. What is fluid mechanics?
  - Study of fluid behaviour at rest a.
  - Study of fluid behaviour in motion b.
  - Study of fluid behaviour at rest and in motion c.
  - d. Study of fluid behaviour at rest and in motion
- 13. Which of the following is the basic principle of fluid mechanics?
  - a. Momentum principle
  - b. Energy equation
  - c. Continuity equation
  - d. All of the mentioned
- 14. When a fluid is called turbulent?
  - High viscosity of fluid a.
  - Reynolds number is greater than 2000 b.
  - Reynolds number is less than 2000 c.
  - d. The density of the fluid is low
- 15. Which of the following is a type of fluid based on viscosity?
  - a. Real Fluid
  - b. Ideal Fluid
  - Newtonian Fluid c.
  - All of the mentioned d.
  - The range of the membership function of a fuzzy set is
    - a. [0, 1]
    - b.  $[0,\infty)$

16.

- c.  $\mathbb{R}$
- (-∞, 0] d.

If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.2}{a} + \frac{0.5}{b} + \frac{0.7}{c} + \frac{0.9}{d}$ , then level set of a given fuzzy set A is: 17. a. {*a*, *b*, *c*, *d*}

- b.  $\{0.2, 0.5, 0.7, 0.9\}$
- $\{0.3, 0.6, 0.8, 1.0\}$ c.
- d. {1,2,3,4}

If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.8}{a} + \frac{1.0}{b} + \frac{0.3}{c} + \frac{0.1}{d}$ , then the  $\alpha$  -cut set for  $\alpha = 0.3$  is: 18.

- a.  $\{a, c\}$
- {*b*,*c*} b.
- {*a*, *b*, *c*} c.
- d.  $\{a,b\}$
- 19. Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction  $\mu_A(x) = \frac{x}{x+2}$  then the  $\alpha$  –cut set for  $\alpha = 0.3$  is:
  - $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ a.
  - $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ b.
  - c.  $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
  - d. None of the above
- 20. The height h(A) of a fuzzy set A is defined as  $h(A) = \sup A(x)$ . Then
  - a. h(A)=0
  - b. h(A) < 1
  - c. h(A)>1
  - d. h(A)=1

#### Impact and Students Reception:

Students participating of the certificate course are very excited about to knowing the new concept of fuzzy set theory and decision making in the uncertain environment. Students have been quite benefited from learning the technique of using MATLAB and MATHEMATICA to solve complicated problems. Further, this will help students in their higher studies and research. By learning all these, students will be motivated to pursue these interesting and important topics in their higher studies. Moreover, this will help them in their competitive exams, JAM, NET, GATE, etc.

The attendance is satisfactory and most of the students are interested to study this topic in details. Their curiosity about to learn this type of different topics outside of their syllabus is more enthusiastic and significant for the teachers as well as the college also.



Department of Mathematics \*\*\* Kharagpur College Response Sheet for Evaluation of Certificate Course on

"Advancements of Mathematics for UG Level"

Name of the Student: SAYANI MAHAPATRA Roll No. 2218060 Semester: 2nd

MCQ Type Questions: Full Marks- 20 : Time- 1 Hour :

Date of Exam- 12<sup>th</sup> June, 2023

#### Tick $(\sqrt{})$ the Correct Answer:

- What is the output of the following code in MATLAB?-1.  $p = 1:5; q = p.^3$ a. [1 125] b. [1 2 3 4 5] √c. [1 8 27 64 125] d. [125 64 27 8 1] A matrix of 1's of order 3x2 can be obtained in MATLAB using 2. a. Zeros(3,2) b. Ones(3,2) . ones(3,2) rand(3,2) d. 3 . The command for building this matrix is: 3. 4 8 9 Let A =6 2 a. A=[1 4 5;3 8 6;4 9 2] b: A=[1 3 4;4 8 9;5 6 2] c. A=[134; 145;6892] d. A=[1 3 4;4 8 10;5 6 2] Command for getting a submatrix of  $B = \begin{pmatrix} 3 & 4 \\ 6 & 2 \end{pmatrix}$  of the matrix A is 4. B=A(2:3;2:3) a. B=A(1:3;1:2) b. \_B=A(1:2;1:2) C. B=A(1:3;2:3) Let V = (1,2,3,4,5,6,7,8,9,10). How to find product of the elements of V 5. a. V=1:10;sum(V) V=1:2:10;prod(V) b. ve. V=1:10;prod(V) d. V=1:1:10;multi(V) The probability of any event is 6. is greater than 1 a./ N. lies between 0 and 1 may be any real number c. none of these. d. A coin is tossed three times in succession, the number of sample points in the sample space is 7.
  - a. 6
  - Vb. 8
  - c. 3
  - d. 16
  - 8. A number is chosen at random from first 100 natural numbers. The probability of the chosen number being multiple of 8 is
    - a. 7/12
    - b. 31/25 c. 7/10
    - c. 7/10
  - 9. The range of a random variable X is

a.  $0 < X < \infty$ b.  $-\infty < X < 0$ c.  $-\infty < X < \infty$ 

-1 < X < 1d. If f(x) be any probability density function, then a  $f(x) \ge 0$  and  $\int_{-\infty}^{\infty} f(x) dx = 1$ . 10. 3/  $f(x) \leq 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$   $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 0.$   $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$   $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$   $f(x) = \begin{cases} kx(1-x), & 0 < x \leq 1\\ 0, & elsewhere \end{cases}$  The value of k for which f(x) defines a probability density function b. c. d. 11. Let f(x)a 6 K. 4 c. 5 . d. What is fluid mechanics? 12. Study of fluid behaviour at rest a. Study of fluid behaviour in motion b. Study of fluid behaviour at rest and in motion Study of fluid behaviour at rest and in motion d. Which of the following is the basic principle of fluid mechanics? 13. Momentum principle a. b. Energy equation c. Continuity equation d. All of the mentioned 14. When a fluid is called turbulent? High viscosity of fluid a. Reynolds number is greater than 2000 b Reynolds number is less than 2000 c. d. The density of the fluid is low 15. Which of the following is a type of fluid based on viscosity? Real Fluid a. b. Ideal Fluid Newtonian Fluid c. A. All of the mentioned 16. The range of the membership function of a fuzzy set is A. [0, 1]b. [0,∞) R c. d. (-∞, 0] If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.2}{a} + \frac{0.5}{b} + \frac{0.7}{c} + \frac{0.9}{a}$ , then level set of a given fuzzy set A is: 17. a.  $\{a, b, c, d\}$ b. {0.2,0.5,0.7,0.9}  $\{0.3, 0.6, 0.8, 1.0\}$ c. d. {1,2,3,4} If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.8}{a} + \frac{1.0}{b} + \frac{0.3}{c} + \frac{0.1}{d}$  then the  $\alpha$  -cut set for  $\alpha = 0.3$  is: 18.  $\{a,c\}$ a. b.  $\{b,c\}$ vc.  $\{a, b, c\}$ d. {*a*,*b*} Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction 19.  $\mu_A(x) = \frac{x}{x+2}$  then the  $\alpha$  -cut set for  $\alpha = 0.3$  is: *{*0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10*}* [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]c.  $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$ d. None of the above 20. The height h(A) of a fuzzy set A is defined as  $h(A) = \sup A(x)$ . Then a. h(A)=0 b. h(A)<1 c. ∠h(A)>1 h(A)=1

Department of Mathematics \*\*\* Kharagpur College **Response Sheet for Evaluation of Certificate Course on** "Advancements of Mathematics for UG Level" Name of the Student: SUBHAM BHUNIA Roll No. 2218078 Semester: 2 Date of Exam- 12th June, 2023 MCQ Type Questions: Full Marks- 20 ; Time- 1 Hour ; Tick  $(\sqrt{})$  the Correct Auswer: 1. What is the output of the following code in MATLAB? 12.1  $p = 1:5; q = p.^3$ a. [1 125] h [12345] [1 8 27 64 125] d. [125 64 27 8 1] 2 A matrix of 1's of order 3x2 can be obtained in MATLAB using a. Zeros(3,2) b. Ones(3,2) d. rand(3,2) 1 3 3. 4 8 9 . The command for building this matrix is: Let A =6 2/ 5 A=[145;386;492] a. A=[1 3 4;4 8 9;5 6 2] c. A=[134;145;6892] d. A=[1 3 4;4 8 10;5 6 2] Command for getting a submatrix of  $B = \begin{pmatrix} 3 & 4 \\ 6 & 2 \end{pmatrix}$  of the matrix A is 4. B=A(2:3;2:3) a. b. B=A(1:3:1:2) c. B=A(1:2;1:2) at B=A(1:3;2:3) 5. Let V = (1,2,3,4,5,6,7,8,9,10). How to find product of the elements of V a. V=1:10;sum(V) V=1:2:10;prod(V) b. 0. V=1:10;prod(V) d. V=1:110;multi(V) 6. The probability of any event is is greater than 1 8. b, lies between 0 and 1 may be any real number d' none of these. A coin is tossed three times in succession, the number of sample points in the sample space is 7. 2 6 ł. 8 3 c. d. 16 A number is chosen at random from first 100 natural numbers. The probability of the chosen number being 8. multiple of 8 is a. 7/12 31/25 b. 7/10 C MI. 3/25 0 The range of a random variable X is  $0 < \lambda' < \infty$ a.  $-\infty < \chi < 0$ 

 $-\infty < \lambda' < \infty$ 

-1 < X < 1d.

If f(x) be any probability density function, then 10.

b.

 $f(x) \ge 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$   $f(x) < 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$   $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 0.$ c.

d. f(x) > 0 and  $\int_{-\infty}^{\infty} f(x) dx = 1$ . Let  $f(x) = \begin{cases} kx(1-x), & 0 < x \le 1\\ 0, & elsewhere \end{cases}$ . The value of k for which f(x) defines a probability density function 11.

4 ç.

12.

- 5 d.
- What is fluid mechanics?
  - Study of fluid behaviour at rest a.
  - Study of fluid behaviour in motion b. Study of fluid behaviour at rest and in motion
  - c. Study of fluid behaviour at rest and in motion

d Which of the following is the basic principle of fluid mechanics?

- 13. Momentum principle a.
  - **Energy** equation b.
  - Continuity equation c.
  - All of the mentioned
- When a fluid is called turbulent? 14.
  - High viscosity of fluid a.

Reynolds number is greater than 2000 nt.

- Reynolds number is less than 2000 c.
- The density of the fluid is low d.
- Which of the following is a type of fluid based on viscosity? 15.
  - Real Fluid a.
  - Ideal Fluid b.
  - Newtonian Fluid
  - All of the mentioned d.
- The range of the membership function of a fuzzy set is 16.
  - [0, 1]**A**.
  - Ь. [0, ∞)

(-∞, 0] d.

If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.2}{a} + \frac{0.5}{b} + \frac{0.7}{c} + \frac{0.9}{d}$ , then level set of a given fuzzy set A is: 17.

- $\{a, b, c, d\}$ A.
  - b. {0.2,0.5,0.7,0.9}
  - {0.3,0.6,0.8,1.0} c.  $\{1,2,3,4\}$ d.

If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.8}{a} + \frac{1.0}{b} + \frac{0.3}{c} + \frac{0.1}{d}$ , then the  $\alpha$  -cut set for  $\alpha = 0.3$  is: 18.

- $\{a,c\}$ a.
- {*b*,*c*} b.
- $\{a, b, c\}$

d. 
$$\{a,b\}$$

- Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction 19.  $\mu_A(x) = \frac{x}{x+2}$  then the  $\alpha$  -cut set for  $\alpha = 0.3$  is:
  - a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
  - **b**. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
    - $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$ c.
    - d. None of the above
- The height h(A) of a fuzzy set A is defined as  $h(A) = \sup A(x)$ . Then 20.
  - h(A)=0a.
  - b. h(A)<1
  - b(A)>1 C.
  - M. h(A)=1



Department of Mathematics \*\*\* Kharagpur College Response Sheet for Evaluation of Certificate Course on

"Advancements of Mathematics for UG Level"

Name of the Student: MONALISHA PRADHAN Roll No. 2218033 Semester: 2nd

MCQ Type Questions: Full Marks- 20 : Time- 1 Hour :

Date of Exam- 12<sup>th</sup> June, 2023

#### Tick $(\sqrt{})$ the Correct Answer:

1.	What is the output of the following code in MATLAB? $p = 1:5; q = p.^3$
	a. [1 125]
	b. [1 2 3 4 5]
	c-f1 8 27 64 125]
	d. [125 64 27 8 1]
2.	A matrix of 1's of order 3x2 can be obtained in MATLAB using
	a. Zeros(3,2)
	b. Ones(3,2)
	c. ones(3,2)
	d. $rand(3,2)$
	$(1 \ 3 \ 4)$
3.	Let $A = \begin{pmatrix} 4 & 8 & 9 \end{pmatrix}$ . The command for building this matrix is:
	5 6 2/
	a. A=[1 4 5;3 8 6;4 9 2]
	B. A=[1 3 4;4 8 9;5 6 2]
	c. $A = \begin{bmatrix} 1 & 3 & 4 \\ 1 & 4 & 5 & 6 & 8 & 9 & 2 \end{bmatrix}$
	d. $A=[1 3 4;4 8 10;5 6 2]$
4.	Command for getting a submatrix of $B = \begin{pmatrix} 5 & 4 \\ 6 & 2 \end{pmatrix}$ of the matrix A is
	$B = \Delta(2, 2, 2, 3)$
	a. $B = A(2.3, 2.3)$ b. $B = A(1,3;1;2)$
	B = A(1:2;1:2)
	A = A(1:2:7:3)
5	Let $V = (12345678910)$ How to find product of the elements of V
5.	$V = \frac{1}{1000} (V)$
	$h = V = 1.22 \cdot 10.000 \text{ mm}$
	V = 1.2.10; prod(V)
	$d = V = 1 \cdot 1 \cdot 10 \cdot \text{multi}(V)$
6	The probability of any event is
0.	a is greater than 1
	N lies between 0 and 1
	c may be any real number
	d none of these.
7	A coin is tossed three times in succession, the number of sample points in the sample space is
	a. 6
	Y 8
	c. 3
	d. 16
8.	A number is chosen at random from first 100 natural numbers. The probability of the chosen number being
	multiple of 8 is
	a. 7/12
	b. 31/25
	c. 7/10
	3/25
9.	The range of a random variable X is
104 M	a. $0 < X < \infty$
	b. $/ -\infty < X < 0$
	$\sqrt{c}$ , $-\infty < X < \infty$

10. If 
$$f(z)$$
 is any probability density function, then  
11. If  $f(x) \ge 0$  and  $\int_{-\pi}^{\pi} f(x) dx = 1$ .  
12. If  $f(x) \ge 0$  and  $\int_{-\pi}^{\pi} f(x) dx = 1$ .  
13. Let  $f(x) = \begin{pmatrix} x(1-x) \\ 0 \\ - & e + f(x) \\ 0 \\ - & e + f(x) \\ 0 \\ - & e + f(x) \\ - & e$ 

### Department of Mathematics \*\*\* Kharagpur College Response Sheet for Evaluation of Certificate Course on

"Advancements of Mathematics for UG Level"

Name of the Student: MAHADEB SAREN Roll No. 2118031

Semester:



-1 < X < 110. If f(x) be any probability density function, then  $f(x) \ge 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1,$  $f(x) < 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$ b.  $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 0.$  $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$ C. d.  $\begin{cases} kx(1-x), & 0 < x \le 1 \\ 0, & elsewhere \end{cases}$ . The value of k for which f(x) defines a probability density function Let f(x) =0 a. 6 ь. c. 4 Vd. 5 12 What is fluid mechanics? Study of fluid behaviour at rest a, Study of fluid behaviour in motion b. 1.0. Study of fluid behaviour at rest and in motion d. Study of fluid behaviour at rest and in motion Which of the following is the basic principle of fluid mechanics? a. Momentum principle b. **Energy** equation c. Continuity equation Ld. All of the mentioned When a fluid is called turbulent? High viscosity of fluid a. Reynolds number is greater than 2000 Lb. Reynolds number is less than 2000 C. d The density of the fluid is low Which of the following is a type of fluid based on viscosity? a. Real Fluid b. **Ideal Fluid** c. Newtonian Fluid Ud. All of the mentioned 16. The range of the membership function of a fuzzy set is La. [0, 1]b. [0,∞) R c. d. (-∞, 0] If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.2}{a} + \frac{0.5}{b} + \frac{0.7}{c} + \frac{0.9}{d}$ , then level set of a given fuzzy set A is: La.  $\{a, b, c, d\}$ {0.2,0.5,0.7,0.9} Ь. {0.3,0.6,0.8,1.0} c. d. {1,2,3,4} If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.8}{a} + \frac{1.0}{b} + \frac{0.3}{c} + \frac{0.1}{d}$ , then the  $\alpha$  -cut set for  $\alpha = 0.3$  is: 18. a.  $\{a, c\}$  $\{b,c\}$ b. c.  $\{a, b, c\}$ ٧đ.  $\{a, b\}$  $\mu_A(x) = \frac{x}{x+2} \text{ then the } \alpha - \text{cut set for } \alpha = 0.3 \text{ is:}$ a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10} b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction 19  $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ c. {2, 3, 4, 5, 6, 7, 8, 9, 10} d. None of the above The height h(A) of a fuzzy set A is defined as  $h(A) = \sup A(x)$ . Then 20 a. h(A)=0b. h(A)<1 c. h(A)>1 ∽d. h(A)=1



# Department of Mathematics \*\*\* Kharagpur College Response Sheet for Evaluation of Certificate Course on

"Advancements of Mathematics for UG Level"

Name of the Student: TAMASA CHOWDHURY

Roll No. 2118103

Semester: 4th

MCQ Type Questions: Full Marks- 20 : Time- 1 Hour ; Date of Exam- 12th June, 2023 Tick  $(\sqrt{})$  the Correct Answer: What is the output of the following code in MATLAB?  $p = 1:5; q = p.^3$ a. [1 125] b. [12345] ve. [1 8 27 64 125] d. [125 64 27 8 1] A matrix of 1's of order 3x2 can be obtained in MATLAB using 3. Zeros(3,2) b. Ones(3,2) ¢. ones(3,2) d. rand(3,2) 1 3 3. 4 8 . The command for building this matrix is: Let A =9 5 6 2 A=[1 4 5;3 8 6;4 9 2] ₩. A=[134;489;562] C. A=[1 3 4; 1 4 5;6 8 9 2] d. A=[1 3 4;4 8 10;5 6 2] Command for getting a submatrix of  $B = \begin{pmatrix} 3 & 4 \\ 6 & 2 \end{pmatrix}$  of the matrix A is B=A(2:3;2:3) b. B=A(1:3;1:2)C. B=A(1:2;1:2)B=A(1:3;2:3) Let V = (1,2,3,4,5,6,7,8,9,10). How to find product of the elements of V V=1:10;sum(V) а. V=1:2:10;prod(V) Ь. V=1:10;prod(V) V. đ. V=1:1:10;multi(V)The probability of any event is is greater than 1 a. V lies between 0 and 1 C. may be any real number đ. none of these. A coin is tossed three times in succession, the number of sample points in the sample space is 6. 8 3 C, đ, 16 A number is chosen at random from first 100 natural numbers. The probability of the chosen number being a. 7/12 31/25 ۰b. 7/10 C. V. 3/25 The range of a random variable X is a, 0<X<00 b.  $-\infty < X < 0$ ×. -0 < X < 00

-1 < X < 1d. If f(x) be any probability density function, then  $f(x) \ge 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$   $f(x) < 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$   $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 0.$   $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$   $f(x) > 0 \text{ and } \int_{-\infty}^{\infty} f(x) dx = 1.$ .a. b. c. d.  $\begin{cases} kx(1-x), 0 < x \le 1\\ 0, elsewhere \end{cases}$ . The value of k for which f(x) defines a probability density function 11. 0 a. 6 \$· 4 c. d. 5 What is fluid mechanics? Study of fluid behaviour at rest a. Study of fluid behaviour in motion b. ve. Study of fluid behaviour at rest and in motion Study of fluid behaviour at rest and in motion d. Which of the following is the basic principle of fluid mechanics? Momentum principle a. Energy equation b. Continuity equation c. J. All of the mentioned When a fluid is called turbulent? a. 1. High viscosity of fluid Reynolds number is greater than 2000 c. Reynolds number is less than 2000 d. The density of the fluid is low Which of the following is a type of fluid based on viscosity? 15. a. Real Fluid b. Ideal Fluid Newtonian Fluid c. V. All of the mentioned The range of the membership function of a fuzzy set is 16. Na [0, 1]Ь. [0, ∞) c. R d. (-∞, 0] If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.2}{a} + \frac{0.5}{b} + \frac{0.7}{c} + \frac{0.9}{d}$ , then level set of a given fuzzy set A is:  $\{a, b, c, d\}$ b.  $\{0.2, 0.5, 0.7, 0.9\}$ c.  $\{0.3, 0.6, 0.8, 1.0\}$ d. {1,2,3,4} If  $X = \{a, b, c, d\}$  and fuzzy set  $A = \frac{0.8}{a} + \frac{1.0}{b} + \frac{0.3}{c} + \frac{0.1}{d}$ , then the  $\alpha$  -cut set for  $\alpha = 0.3$  is: 18.  $\{a,c\}$ {*b*,*c*} c.  $\{a, b, c\}$ d.  $\{a, b\}$ Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction  $\mu_A(x) = \frac{x}{x+2} \text{ then the } \alpha - \text{cut set for } \alpha = 0.3 \text{ is:}$ a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10} a. V: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} {2, 3, 4, 5, 6, 7, 8, 9, 10} c. d. None of the above The height h(A) of a fuzzy set A is defined as  $h(A) = \sup A(x)$ . Then a. h(A)=0b. h(A)<1 c. h(A) > 1 $\sqrt{h(A)}=1$ 



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