

2018

M.Sc.

4th Semester Examination

**APPLIED MATHEMATICS WITH OCEANOLOGY AND
COMPUTER PROGRAMMING**

PAPER—MTM-403

Subject Code—21

Full Marks : 50

Time : 2 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Unit—I

(Magneto Hydro-dynamics)

[Marks : 25]

Answer Q. No. 1 and any two from the rest.

1. Answer any two questions : 2×2

- (a) Write Lorentz force equation when the conducting material as conductor is moving with velocity \vec{U} in presence of \vec{E} and \vec{B} .

(Turn Over)

- (b) State Ferraro's law of isorotation.
- (c) For the magnetohydrodynamic Couette flow, write the momentum equation in vector form, and then after simplification write its component form.
2. Prove that for a conductive fluid in a magnetic field, the magnetic body force per unit volume is equivalent to a tension per unit area along the lines of force, together with a hydrostatic pressure. 8
3. Obtain the velocity components for Hartmann flow between two parallel plates separated by a distance $2l$. 8
4. (a) Show that electrostatic field is irrotational. 4
- (b) Derive the equation of conservation of charge. 4

[Internal Assessment : 05 Marks]

Unit—II

(Soft Computing)

[Marks : 25]

Answer Q. No. 5 and any *two* from the rest.

5. Answer any *two* questions : 2×2
- (a) What do you mean by linearly separable patterns ? 2

- (b) Find the fuzzy relational matrix of "a young tall man", where

$$\text{"Young man"} = \frac{0}{15} + \frac{0.5}{20} + \frac{1}{25} + \frac{0.5}{30} + \frac{0}{35} \text{ and}$$

$$\text{"Tall man"} = \frac{0}{170} + \frac{0.5}{175} + \frac{1}{180} + \frac{1}{185} + \frac{1}{190}. \quad 2$$

- (c) Explain two- and three-point cross overs in Binary Genetic Algorithm.
- (d) What is Activation Function? Mention two such Activation Functions in Neural Net work.

6. Using Real coded Genetic Algorithm,

$$\text{Max } f(x) = x^3 - 12x^2 + 45x, \quad x \in [0, 4]$$

for the following information.

Initial population : 1.852, 3.828, 1.380, 1.472, 1.776

Random Nos. For selection : 0.46, 0.30, 0.82, 0.90, 0.56

$$p_c = 0.4, \quad p_m = 0.2$$

Random Nos. for crossover : 0.346, 0.130, 0.982, 0.090, 0.656

λ (for Arithmetic crossover) = 0.346

Random Nos. for mutation : 0.19, 0.59, 0.65, 0.45, 0.96

For random mutation, permutation value = $\Delta = 1.20$

random No. = $r = 0.55$.

8

7. (a) Realize the logical XOR function using McCulloch-Pitts neuron model. 6
- (b) What are the differences between traditional computing and soft computing? 2
8. (a) Write down the perception learning algorithm for single output class. 4
- (b) Describe different inference schemes for fuzzy conditional propositions. 4

[Internal Assessment : 05 Marks]
