BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO – 2022)

CLASS: M.TECH & PRE PHD **SEMESTER: 1st**
BRANCH: MECHANICAL **SESSION: MO/22**

SUBJECT: ME507 OPTIMIZATION TECHNIQUES

TIME: 03 Hrs. **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1 Explain [10]
i. Objective function
ii. Factor
iii. Levels
iv. Response
v. Effect
in relation to optimization with suitable examples (CO-1, BT-H)

Q.2(a) Elaborate on the advantages of Taguchi Methodology over Response Surface Methodology. (CO-2, BT-H) [4]

Q.2(b) A company makes two products (X and Y) using two machines (A and B). Each unit of X that is produced, requires 50 minutes processing time on machine A and 30 minutes processing time in machine B. Each unit of Y that is produced requires 24 minutes processing time on machine A and 33 minutes processing time on machine B. At the start of the current week, there are 30 units of X and 90 units of Y in stock. Available processing time on machine A is forecast to be 40 hours and on machine B is forecast to be 35 hours. The demand for X in the current week is forecast to be 75 units and for Y is forecast to be 95 units. Company policy is to maximise the combined sum of the units of X and the units of Y in stock at the end of the week. Formulate the problem of deciding how much of each product to make in the current week. (CO-2, BT-H) [6]

Q.3(a) Elaborate the term fuzzy variable. Can a fuzzy membership be True and False at the same time? (CO-3, BT-H) [5]

Q.3(b) Consider the following real variable from everyday life; A traffic light measured in what colour is on. The respondent to this query provided the response as {Red, Yellow, Green}. Will it be logical to use the variable as a fuzzy variable? Defend your answer with proper reasoning. (CO-3, BT-H). [5]

Q.4 For the following functions, evaluate the optimum (i.e. maximum or minimum) value of z subject to the given constraint. [10]

i. $z = -7x^2 + 6xy - 9y^2$ subject to the constraint 2x+y= 165

ii. $z = -3x^2 + 40x + 8xy + 288y - 10y^2$ subject to the constraint x+ 2y= 58

(CO-4, BT-H)

Q.5(a) Name and briefly discuss the main features of Genetic Algorithms (GA). (CO-5, BT-M) [5]

Q.5(b) Explain the parameters used to analyse Artificial Neural Network. (CO-5, BT-H) [5]

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