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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90043

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fifth Semester

Artificial Intelligence and Data Science

AD 8501 — OPTIMIZATION TECHNIQUES

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What do you mean by a general LPP?
2. What is the advantage of dual simplex method?
3. Define feasible solution.
4. State the necessary and sufficient condition for the existence of a feasible solution to a transportation problem.
5. Can the critical path change? Justify.
6. What is a WBS?
7. What is an Equality constraint?
8. What is classical method of optimization?
9. Define transient and steady state.
10. List the characteristics of a queuing system?

PART B — (5 × 13 = 65 marks)

11. (a) Calculate the maximal and minimal value of $z = 5x + 3y$ for the following constraints.

$x + 2y \leq 14$

$3x - y \geq 0$

$x - y \leq 2$

Or

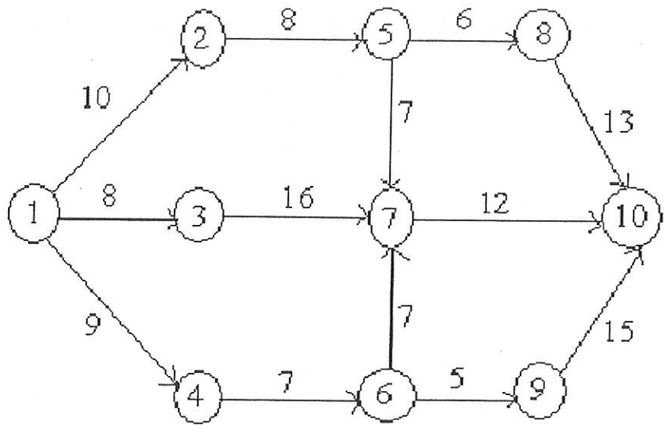
(b) Elucidate Two Phase method.

12. (a) With example explain the assignment problem.

Or

(b) With example explain the Travelling salesman problem with example.

13. (a) Determine the early start and late start in respect of all node points and identify critical path for the following network.



Or

(b) Illustrate the PERT with example.

14. (a) Explain the Newton-Raphson method.

Or

(b) Explain the — inequality constraints

15. (a) On an average 96 patients per 24-hour day require the service of an emergency clinic. Also on an average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs 100 per patient treated to obtain an average servicing time of 10 minutes, and that each minutes of decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from one and one-third patients to half patient.

Or

(b) A television repairman finds that the time spent on his jobs has an exponential distribution with mean of 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets follows a Poisson distribution approximately with an average rate of 10 per 8-hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in?

PART C — (1 × 15 = 15 marks)

16. (a) A tax consulting firm has 3 counters in its office to receive people who have problems concerning their income and sales taxes. On the average 48 persons arrive in an 8 hours day. Each tax advisor spends 15 minutes on the average on an arrival. If the arrivals are Poissonally distributed and service times are exponentially distributed, find

(i) Average number of customers in the system.

(ii) Average number of customers waiting to be served.

(iii) Average time a customer spends in the system.

(iv) Average waiting time for a customer and

(v) Probability that a customer has to wait before he gets service.

(vi) The number of hours each week a tax adviser spends performing his job.

(vii) The expected number of idle tax advisers at any specified time.

Or

(b) A company has a demand of 1200 nits per year for an item and it can produce 2000 such items per month. The cost of one setup is Rs. 400 and the holding cost per unit per month is 15 cents.

(i) Find the optimum lot size.

(ii) Find the total cost per year, assuming the cost of 1 unit as Rs.4.

(iii) What would be the maximum quantity of inventory at any time of the year?

(iv) Find the manufacturing time.

(v) Find the total time.

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