29. Find the optimum order quantity for a product for which the price breaks are as follows.

Quantity	Unit cost (Rs)
$0 \leq Q < 500$	1000
$500 \leq Q_2$	925

The monthly demand of the product is 200 units. The cost of storage is 2% of the unit and the cost of ordering is Rs 350.

30. Explain Hungarian method for solving an Assignment problem using an example.

31. A book binder has one printing press, one binding machine, and the manuscripts of a number of a different books. The time required to perform, the printing and binding operations for each book is shown below.

Determine the order in which books should be processed, in order to minimizes the total time required to turn out all the books.

Books	1	2	3	4	5	6
Printing time(hr)	30	120	50	20	90	100
Binding time(hr)	80	100	90	60	30	10

(5 x 8 = 40 Marks)

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19U315S (Pages: 4) Name: …….

Reg. No……...……

THIRD SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2020

(CUCBCSS - UG)

CC15U BCA3 C06 - OPERATIONS RESEARCH

(Complementary Course)

(2015, 2016 Admissions – Supplementary)

Time: Three Hours Maximum: 80 Marks

PART A

Answer ***all*** questions. Each question carries 1 mark.

1. A model that uses a system of symbols to represent a problem is called

   a) Mathematical b) Iconic c) Analogue d) Symbolic

2. In maximization LPP the objective function coefficient for an artificial variable is --------

   a) +M b) –M c) +1 d) 0

3. Any activity which does not consume either any resource or time is a

   a) Predecessor b) Successor c) Dummy d) End

4. The variables assigned the value zero are called

   a) Non basic variables b) Basic variables

   c) Surplus variables d) Slack variables

5. The objective function in transportation problems is

   a) Maximized b) Minimized c) Optimized d) Well allocated

6. To use Hungarian method, a profit maximization assignment problem requires

   a) Converting all profits to opportunity loss b) A dummy agent or task

   c) Matrix expansion d) None of these

7. PERT is used for projects involving activities of -------- nature

   a) Continuous b) Non repetitive c) Repetitive d) Scant

8. The problem of replacement is not concerned about the

   a) Items that deteriorate gradually

   b) Items that fails suddenly

   c)Determination of optimum replacement interval

   d) Maintenance of an item to work out profitability

9. If EOQ is calculated, but an order is then placed which is smaller that this, will the total inventory cost

   a) Increase b) Decrease c) Either increase d) No change

10. Sequencing problems involving processing of two jobs on n machines

a) Can be solved graphically

b) Cannot be solved graphically

c) Have a condition that the processing of two jobs must be in the same order

d) None of these

(10 x 1 = 10 Marks)

PART B

Answer ***all*** questions. Each question carries 2 marks.

11. What are the features of OR?
12. Write the standard form of a mathematical model of Linear Programming Problem.
13. A ship building firm uses rivets at a constant rate of 20,000 numbers per year. The rivets cost Rs 1.50 per number. The holding cost of rivets is estimated to be 12.5% of unit cost per year. Determine EOQ.
14. Distinguish between Transportation problem and Assignment problem.
15. Describes method of processing two jobs through 'm' machines.

(5 x 2 = 10 Marks)

PART C

Answer any ***five*** questions. Each question carries 4 marks.

16. Explain two-phase method of solving a L.P.P.
17. Solve the following LPP graphically.

Minimize $z = 20x_1 + 40x_2$

Subjected to $36x_1 + 6x_2 \geq 108$

$3x_1 + 12x_2 \geq 36$

$20x_1 + 10x_2 \geq 100$

$x_1, x_2 \geq 0$

18. Explain any one method to obtain an Initial basic feasible solution for a transportation problem?
19. Explain the steps involved in PERT calculations
20. What is no passing rule in a sequencing algorithm?
21. What is EOQ? Derive the EOQ for deterministic inventory model with uniform demand and without shortage.

22. Solve the following assignment problem.

	I	II	III	IV
A	32	26	35	38
B	27	24	26	32
C	28	22	25	34
D	10	10	16	16

23. The cost of a machine is Rs. 6100 and its scrap value is only Rs. 100. The maintenance cost are found from experience to be as under. Formulate a replacement policy.

Year	1	2	3	4	5	6	7	8
Maintenance Cost	100	250	400	600	900	1250	1600	2000

(5 x 4 = 20 Marks)

PART D

Answer any ***five*** questions. Each question carries 8 marks.

24. Solve the LPP using simplex method.

Maximize $z = 10x_1 + 6x_2$

Subjected to $2x_1 + 2x_2 \leq 4$

$10x_1 + 4x_2 \leq 20$

$6x_1 + 16x_1 \leq 24$

$x_1, x_2 \geq 0$

25. Solve the following transportation problem.

	D_1	D_2	D_3	D_4	Supply
Q_1	2	2	2	1	3
Q_2	10	8	5	4	7
Q_3	7	6	6	8	5
Demand	4	3	4	4	15

26. Define Operation Research. Explain its business application.
27. Develop a model for the replacement of items whose maintenance cost increase with time and value of money remains some during the period.
28. Construct network diagram. Also find the critical path.

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time	4	1	1	1	6	5	4	8	1	2	5	7