

PGDORM SEM I
ASSIGNMENTS
Academic Year 2020-21

Please follow the instructions and submit the assignment in the given time.

1. Assignment is compulsory.
2. Last date to submit this assignment is 20th April, 2021.
3. Assignment should be in written format. You can write the assignment in the Assignment sheet that you received from the Institute or can use single line A4 size papers.
4. No typed assignment or Xerox will be accepted.
5. Mention your details on the front page:
 - a) Full Name
 - b) Application ID No.
 - c) Name of the Subject
6. Do not forget to write the page number on each and every page at the top right hand side of the page.
7. Scan and submit the assignment in PDF format on our official MOODLE platform (eclipse.mu.ac.in).

APPLIED MATHEMATICS

(20 Marks)

1. A mother left Rs.15,24,600 For her son and daughter who are 10 and 15 years old. The sum is to be divided and put into an investment giving 10% pa compound interest, such that both will get the same amount when each is 18 years old. How will you divide the sum?
2. A person deposits in a financial institution Rs. 15,000 at the end of each year for 3 years. What is the accumulated amount at the end of 3 years taking interest compounded at 12% pa?
3. A person borrowed totally Rs. 80,000 from two known people. For one load, he paid 18% pa and for the second loan he paid 25% pa. After a year, he paid Rs. 15,800 as simple interest. How much money did he borrow at each rate?
4. A particular sum of money amounts to Rs. 5,13,216 in 2 years and Rs. 5,54,273.28 in 3 years. Find the sum and the compound interest rate.

5. Show that
$$\begin{bmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{bmatrix} = abc \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + 1 \right)$$

6. Solve the following equation by cramer's rule

$$2x - y + 3z = 4, x + y + z = 2, 3x + y - z = 2.$$

7. Find the inverses of the following matrix:
$$\begin{bmatrix} 5 & 3 & 14 \\ 0 & 1 & 2 \\ 1 & -1 & 2 \end{bmatrix}$$

8. From the following information obtain the technology matrix. If this matrix remains s=constant find the total output of two industries when the final demand changes to 240 and 360 respectively.

Industry	Consumption by industry		Final Demand	Total Output
	1	2		
1	120	320	160	600
2	180	320	300	800
Labour	60	160		

9. Differentiate the following w.r.t. x

a. $y = \frac{(2x^3-1)}{3x^2+5} + 4^x$

b. $y = \frac{5e^x + \log x}{10^x + \sqrt{x}}$

10. If the demand function is given by $p = 4 + 3D - 5D^2$, find

- a) Total revenue function
 - b) Average revenue
 - c) Marginal revenue when the demand is D
- Also find the marginal revenue, when $D=2$

11. Short note (Any 3)

- 1. Explain Annuity and different type of annuity
- 2. Explain matrices and different type of matrices
- 3. Explain any two properties of determinant
- 4. Explain Sinking fund
- 5. Different between Annuity due and immediate annuity

LINEAR PROGRAMMING

(20 Marks)

- Q. 1) A factory manufactures two products A and B.
To manufacture one unit of A, 1.5 machine hours and 2.5 labour hours are required.
To manufacture product B, 2.5 machine hours and 1.5 labour hours are required.
In a month, 300 machine hours and 240 labour hours are available.
Profit per unit of A is Rs. 50 and for B is Rs. 40. Formulate LPP.
- Q. 2) Maximize $Z = 100x + 80y$
Subject to,
 $6x + 4y \leq 7200$
 $2x + 4y \leq 4000$
 $x \geq 0$ and $y \geq 0$. Solve Graphically.
- Q. 3) Maximize $Z = 3x + 7y$
Subject to,
 $2x + 5y \leq 20$
 $x + 2y \leq 4$
 $x \geq 0$ and $y \geq 0$. Solve by Simplex method.
- Q. 4) Explain following:
a) Merits and Demerits of Linear Programming
b) Feasible region in Graphical method
c) Slack variable in Simplex Table
d) Infeasible solution in LPP

BASIC STATISTICS

(20 Marks)

1) Calculate Median, Mean, Mode, 7th Decile, 35th Percentile

Weekly wages	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 -100	100 - 110
frequency	15	19	25	23	21	22	15

2) Draw histogram & hence find mode.

Marks	65 – 70	70 -75	75 - 80	80 – 85	85 - 90	90 - 95	95 - 100
Number of candidates	2	10	10	25	20	18	15

3) Which salesman is more consistent in sales.

Salesman I	40	45	50	55	60	65	70	75
Salesman II	15	30	30	35	35	50	60	60

4) Find the Standard Deviation & Coefficient of variation.

Marks	15 - 17	17 - 19	19 - 21	21 - 23	23 - 25	25 - 27	27 - 29
Frequency	7	3	3	5	4	5	3

Q5).

a) A bag contains 5 white & 7 black balls. Find the probability of drawing i) 3 white ball ii) 2 white & 1 black ball.

b) There are 40 tickets numbered 1 to 40. One ticket is drawn at random, what is the probability that the number on the ticket drawn is divisible by i) 3 or 5 ii) 3 or 7.

c) Write a note on ‘Testing of Hypothesis’.

OPTIMIZATION MODELS 1

(20 Marks)

1. Five jobs I, II, III, IV, V are to be processed on three machine A, B, and C in the order ABC.

Jobs	Processing Time (Min)		
	Machine A	Machine B	Machine C
I	22	21	23
II	25	22	24
III	23	19	22
IV	22	20	25
V	24	19	20

- i. Find Total elapsed time
 - ii. Idle time for each machine A, B, C
2. A machine costs ₹ 9000. Its maintenance cost is ₹ 600 in the first year and increases by ₹ 500 in each succeeding year. If the money is worth 10% per year, then find the optimum replacement period for the machine.
3. The maintenance engineer for a large construction company is examining alternative open to him for replacement of hydraulic on the firm's 100 front – end loaders ; each loader uses six hoses which from historical maintenance records fall at this rate:

Month:	1	2	3	4	5
% required replacement by that month:	10	15	20	70	100

The maintenance engineer learns that in the field replacement cost

Rs. 80 per hose while it cost only Rs. 40 per hose if all the hose were replaced at regular intervals during routine maintenance and service. Evaluate the alternative open to this engineer and recommend a course of action.

4. A self service store employs one cashier at its counter. Nine customers arrive on an average every 5 mins while the cashier can serve 10 customers in 5 mins. Assuming Poisson distribution for arrival and exponential distribution for service time, find
- a) Average number of customer in system
 - b) Average number of customer in queue.
 - c) Average number of time spend in system
 - d) Average time a customer wait before being server.

5. A person repairing radio find that the time spent on the radio sets has exponential distribution with mean 20 min. If the radio is repaired in the order in which they come in their arrival is approximately Poisson with an average rate of 15 for 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?
6. A company manufactures around 200 mopeds depending upon the availability of raw material and other conditions, the daily production has been varying from 196 mopeds to 204 mopeds whose probability distribution is as given below:

Production/Day	196	197	198	199	200	201	202	203	204
Probability	0.05	0.09	0.12	0.14	0.20	0.15	0.11	0.08	0.06

The finished mopeds are transported in a 3 storied lorry that can accommodate only 200 mopeds.

Using the following 15 random number: 82, 89, 78, 24, 53, 61, 18, 45, 04, 23, 50, 77, 27, 54, 10

Simulate the process to find out:

1. What will be the average no. of mopeds waiting in the factory?
2. What will be the number of empty spaces in lorry?