P.G.D.O.R.M (Part-I)

Basic O.R (I)

Aug
2019

Con. 355-19.

AB–7666

(3 Hours)

[Total Marks : 100

N.B. : (1) Answer any **FIVE** questions.

(2) **All** questions carry **equal** marks.

(3) **Figures** to the **right** indicates **marks** of the **question/ sub question.**

(4) **Graph paper** will be supplied on **request.**

(5) **Use of Scientific, Hand held Non programmable** calculator is **allowed.**

1. (a) Draw a network diagram from the following activities. Find the critical path. **10**
Also find the

(i) Earliest Start Time

(ii) Earliest Finish Time

(iii) Latest Start Time

(iv) Latest Finish Time

(v) Total Float for each activity

Activity	1-2	2-3	2-4	3-5	4-5	4-6	4-7	5-7	6-7	7-8
Duration (days)	1	5	3	4	2	5	9	4	2	2

(b) The ABC Company tool room is staffed by one clerk who can serve 12 production **10**
employees, on the average, each hour. The production employees arrive at the
tool room every six minutes, on the average. Calculate:

(i) The average time an arriving production employee will have to wait before
getting serviced.

(ii) The average time the clerk remains idle.

[TURN OVER

(1)

2. (a) Veerman Furniture Company makes three kinds of office furniture: chairs,   **10**
desks, and tables. Each product requires some labor in the parts fabrication
department, the assembly department, and the shipping department. The furniture
is sold through a regional distributor, who has estimated the maximum potential
sales for each product in the coming quarter. Finally, the accounting department
has provided some data showing the profit contributions on each product. The
decision problem is to determine the product mix-that is, to maximize Veerman's
profit for the quarter by choosing production quantities for the chairs, desks,
and tables. The data shown below summarizes the parameters of the problem.

Hours per Unit

Department	Chairs	Desks	Tables	Hours Available
Fabrication	4	6	2	1,850
Assembly	3	5	7	2,400
Shipping	3	2	4	1,500
Demand Potential	360	300	100	
Profit	$15	$24	$18	

Formulate the above problem as a Linear programming problem.

(b) In an election campaign, the strategies adopted by the ruling and opposition party   **10**
alongwith pay-offs (ruling party's % share in votes polled) are given below:

| Ruling Party's Strategies | Opposition Party's Strategies | | |
	Campaign one day in each city	Campaign two days in large towns	Spend two days in large. rural sectors
Campaign one day in each city	55	40	35
Campaign two days in large towns	70	70	55
Spend two days in large rural sectors	75	55	65

Assume a zero sum game. Find optimum strategies for both parties and expected
payoff to ruling party.

②

3. (a) ABC Ice Cream company has a distribution depot in Greater Kailash Part 1 for   **10**
distributing ice-cream in South Delhi. There are four vendors located in different
parts of South Delhi (call them A, B, C and D) who have to be supplied ice-cream
daily. The following matrix displays the distances (in Kms) between the depot and
the four vendors:

	Depot	Vendor A	Vendor B	Vendor C	Vendor D
Depot	∞	3.5	3	4	2
Vendor A	3.5	∞	4	2.5	3
Vendor B	3	4	∞	4.5	3.5
Vendor C	4	2.5	4.5	∞	4
Vendor D	2	3	3.5	4	∞

What route should the company van follow so that the total distance travelled is
minimised ?

(b) Solve the following LPP graphically   **10**

Objective Function: Maximize $Z = 3X + 4Y$

Subject to constraints

$\quad 4X + 2Y \leq 100$; (Machining Hours)

$\quad 4X + 6Y \leq 180$; (Labour Hours)

$\quad X+Y \leq 40$; (Raw Material)

$\quad X \leq 20$; (Trade restriction) ,

$\quad Y \geq 10$; (agreement restriction)

$\quad X,Y \geq 0$ (non negativity constraint)

4. (a) A construction company has four large bulldozers located at four different garages.   **10**
The bulldozers are to be moved to four different construction sites. The distances
in miles between the bulldozers and the construction sites are given below.

Bulldozer / Site	A	B	C	D
1	90	75	75	80
2	35	85	55	65
3	125	95	90	105
4	45	110	95	115

How should the bulldozers be moved to the construction sites in order to minimize
the total distance travelled ?   **[TURN OVER**

(b) Distinguish between the following   **10**
    (i)   Balanced and unbalanced transportation problem
    (ii)   Degeneracy in Simplex method and in a Transportation problem
    (iii) Infeasible solution in a Graphical method and in a simplex method
    (iv)   PERT and CPM
    (v)   Slack and Float

5. A particular product is manufactured in factories A B, C and D: and is sold at centers   **20**
    1,2 and 3. The cost in ₹ of product per unit and capacity in kgms per unit time of each
    plant is given below :

Factory	Cost (₹) per unit	Capacity (kgms) per unit
A	12	100
B	15	20
C	11	60
D	13	80

The sale price in ₹ per unit and the demand is kgms per unit time are as follows :

Sale Centre	Sale parice (₹) per unit	Demand (Kgms) per unit
1	15	120
2	14	140
3	16	60

Find the optimal sales distribution. (Hint: Convert it into transportation model)

6. Solve the following using simplex method :   **20**
    Maximise: $6X_1 + 5X_2$
    Subject to constraints:
    $X_1 + X_2 \le 5$; $3X_1 + 2X_2 \le 12$; $X_1, X_2 > 0$

7. A company has been offered a contract to build and deliver nine extruding presses. The **20** contract price negotiated is contingent upon meeting a specified delivery time with a bonus for early delivery. The company has estimated the following cost and time information for the project:

Activity	Normal Time (Weeks)			Normal Cost (₹)	Crash Time (Weeks)	Crash Cost (₹)
	a	b	m			
1-2	1	5	3	7000	1	9000
2-3	1	7	4	9000	3	12000
2-4	1	5	3	5000	2	8000
2-5	5	11	8	6000	7	8000
3-6	2	6	4	5000	2	6000
4-6	5	7	6	4000	4	4800
5-7	4	6	5	12000	4	14000
6-7	1	5	3	9000	1	10800

Note: a = optimistic time, b = pessimistic time, c = most likely time,

Normal Delivery time is 16 weeks for a contract price of ₹ 63000. On the basis of the calculated profitability for each delivery time specified in the following table, what deliver schedule do you recommend that the company should implement ?

Contract Delivery Time (Weeks)	15	14	13	12
Contract Amount (₹)	65000	68000	71000	73000

8. (a) Obtain the dual for the following Linear Programming Problems.   **10**

(i) Maximise $Z = 40X_1 + 35X_2$
Subject to $2X_1 + 3X_2 \leq 60$
$4X_1 + 3X_2 \leq 96$
$X_1, X_2 \geq 0$

(ii) Minimise $Z = 10X_1 + 20X_2$
Subject to $3X_1 + 2X_2 \geq 18$
$X_1 + 3X_2 \geq 8$
$2X_1 - X_2 \leq 6$
$X_1, X_2 \geq 0$

[TURN OVER

(b) The following information represents activities associated with a project :   10

Activities	A	B	C	D	E	F	G	H
Precedence Activities	-	-	-	A	B	C	D,E	F,G
Optimistic time (months)	2	3	4	2	4	7	8	5
Pessimistic time (months)	4	7	8	2	8	11	16	11
Most likely time (months)	3	5	6	2	6	9	12	8

Draw the network diagram and determine the following:

(i) Draw the PERT Network and identify the critical path

(ii) Find expected duration and variance of the project

(iii) Find probability that project duration will exceed 36 months

(iv) Find the expected project duration if probability of completion is 90%.

Z value	Probability	Z value	Probability
2.60	0.9953	1.20	0.8849
2.61	0.9955	1.21	0.8869
2.62	0.9956	1.22	0.8888
2.63	0.9957	1.23	0.8907
2.64	0.9959	1.24	0.8925
2.65	0.9960	1.25	0.8944
2.66	0.9961	1.26	0.8962
2.67	0.9962	1.27	0.8980
2.68	0.9963	1.28	0.8997
2.69	0.9964	1.29	0.9015

P.G.D.O.R.M - (Part I)

Basic of OR - (II)

(3 Hours)

[Total Marks : 100

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(3) **Figure** to the **right** shows **marks** to a question/sub-question.
(4) Use of hand held **scientific, non-programmable** calculator is **allowed.**

Q.1 a) A car manufacturer has recently held 3-day road side exhibits on the introduction of a new **10** model of its deluxe cars. The number of sales personnel employed at each of a sample of 10 exhibitions and the number of cars booked at each one are as given below:

No. of salesmen :	5	8	6	8	9	3	5	4	6	6
No. of cars booked:	132	160	148	156	168	102	142	98	152	142

Using this data, regress the number of cars booked on the number of salesmen, and obtain the regression equation. Estimate the number of cars booked if 10 salesmen are employed on an exhibition.

b) Dr. Strong is a dentist who schedules all her patients for 30 minute appointments. Some of the **10** patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and the time actually needed to complete the work.

Service Category	Time required (minutes)	Probability of category
Filling	45 minutes	0.40
Crown	60 minutes	0.15
Cleaning	15 minutes	0.15
Extraction	45 minutes	0.10
Check-up	15 minutes	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well as idleness of the doctor. Assume that all the patients show up at the clinic at exactly their scheduled arrival time starting as 8:00 am. Use the following random numbers for handling the above problem:

40   82   11   34   25   66   17   79

Q.2 a) You are given the following data regarding the processing times of some jobs on three machines, **10** I, II and III. Determine the sequence that minimises the total elapsed time required to complete the jobs.

	Jobs	A	B	C	D	E	F	G
Processing time (Hrs)	Machine 1	3	8	7	4	9	8	7
	Machine 2	4	3	2	5	1	4	3
	Machine 3	6	7	5	11	5	6	12

[TURN OVER

⑦

b) A hardware store procures and sells hardware items. Information on an item is given below: **10**

    Expected annual sales   = 8000 units
    Ordering cost   = Rs. 180 per order
    Holding cost   = 10% of the average inventory value

The item can be purchased according to the following schedule:

Lot size	Unit price (Rs.)
1-999	Rs. 22.00
1000-1499	Rs. 20.00
1500-1999	Rs. 19.00
2000 and above	Rs. 18.50

You are required to determine the best order size.

Q.3 a) The maintenance cost and resale value per year of a machine whose purchase price is **10** Rs. 7,000 is given below :

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.)	900	1200	1600	2100	2800	3700	4700	5900
Resale value (Rs.)	4000	2000	1200	600	500	400	400	400

When should the machine be replaced ?

  b) XYZ company trying to decide which of the two machines to purchase. Each will involve an **10** investment of Rs. 100000. The expected net incremental cash flows are as given in the table below:

Year	Machine A	Machine B
1	50000	20000
2	40000	30000
3	20000	50000
4	20000	40000

The company's cost of capital is 10 percent. Calculate the NPV of each machine. If this is used as the basis of selection, which machine will be purchased ?

Q.4 a) Seven jobs go over machine 1 and then over machine 2. Processing times in hours are given as: **10**

Job	A	B	C	D	E	F	G
Machine 1	6	24	30	12	20	22	18
Machine 2	16	20	20	12	24	2	6

Find the optimal sequence in which jobs should be processed.

  b) ABC Plumbing Supply Company stocks thousands of plumbing items sold to regional plumbers, **10** contractors and retailers. Mr. X, the firm's general manager, wonders how much money could be saved annually if EOQ were used instead of the firm's present rules of thumb. He instructs Mr. Y to conduct an analysis of one material only to examine if significant savings might result from using the EOQ. Mr. Y develops the following estimates from accounting information: Annual demand, D = 10000 units; past quantities being ordered per order = 400 valves/order; Handling cost, C_h = Rs. 4 per unit/year; and Ordering cost, C_0 = Rs. 55/order.

Q.5 The demand for a particular item during the ten months of a year is as given below : **20**

Month	1	2	3	4	5	6	7	8	9	10
Demand	213	201	198	207	220	232	210	217	212	225

The manager is considering how well the exponential smoothing serves as an appropriate technique in forecasting the demand of this item. Smoothing constant α=0.5 is being used by her. You are required to (i) calculate the forecaste value assuming the initial forecast as 208, (ii) calculate MAD for the series of estimates, (iii) calculate the mean squared error (MSE), and mean absolute percentage error (MAPE).

Q.6 A group of process plants in an oil refinery are fitted with valves. Over a period of time, the failure **20** pattern of these 400 valves has been observed and it is as follows:

Month	1	2	3	4	5	6	7	8	Total
No. of valves failing	8	20	48	104	120	56	32	12	400

It costs Rs. 100 to replace each valve individually. If all the valves are replaced at a time, it costs Rs. 50 per valve. The maintenance department is considering following replacement policies:
   (a) To replace all valves simultaneously at fixed intervals, in addition to replacing valves as and when they fail.
   (b) To replace valves as and when they fail.
      Suggest an optimal replacement policy.

Q.7 A small retailer has studies the weekly receipts and payments over the past 200 weeks and has **20** developed the following set of information :

Weekly Receipts (Rs.)	Probability	Weekly Payments (Rs.)	Probability
3000	0.20	4000	0.30
5000	0.30	6000	0.40
7000	0.40	8000	0.20
12000	0.10	10000	0.10

Using the following sequence of random numbers, simulate the weekly pattern of receipts and payments for the 12 weeks of the next quarter, assuming further that the beginning bank balance is Rs. 8000. What is the estimated balance at the end of the 12 weeks period? What is the highest weekly balance during the quarter? What is the average weekly balance for the quarter?
Random numbers

For Receipts	3	91	38	55	17	46	32	43	69	72	24	22
For payments	61	96	30	32	3	88	48	28	88	18	71	99

Q.8 Write Short Notes; use illustrations wherever necessary : **20**
   1) Heuristic Programming
   2) Forecasting models
   3) Monte Carlo simulation
   4) Advantages and disadvantages of EOQ model of inventory management.

Con. 365-19.   **AB-7931**

(3 Hours)   [Total Marks : 100

N.B. : (1) In **Section I**, Q. 1 is **compulsory**.

      (2) In **Section I**, Attempt any two questions from Question 2 to Question 5.

      (3) In **Section II**, Q. 5 is compulsory.

      (4) In **Section II**, Attempt any **two** Questions from Question **6** to Question **8**.

      (5) Figures to the **right** indicates marks to the sub-question.

      (6) Use of Handheld, Scientific, Non-programmable calculator is **allowed**.

      (7) Draw figures wherever **necessary**.

      (8) **Descriptive** answer should be **to the point**.

Section I

1. (a) Distinguish between the following pairs.   2x3=6

      (i) Perfectly Elastic Demand and Absolutely Inelastic Demand.

      (ii) Derived Demand and Autonomous Demand.

      (iii) Escapable Cost and Inescapable Cost.

   (b) Complete the following Short Run Production Schedule.   2x3=6

Fixed Factor Land	Variable Factor Labour	Total Production	Average Production	Marginal Production	Stage of
1	0	0			
1	1	100			
1	2	220			
1	3	360			
1	4	480			
1	5	580			
1	6	660			
1	7	700			
1	8	700			
1	9	630			

[TURN OVER

6

(c) Calculate the Total Fixed Cost from the following figures.

Output (in units)	Total Cost (in ₹)
34,220	1,38,800
13,680	87,500

8

2. (a) Describe any four characteristics of Managerial Economics.   8

   (b) State and explain the Law of Demand.

8

3. (a) Explain any four applications of Price Elasticity of Demand.   8

   (b) Discuss any four determinants of Durable Consumer Goods.

8

4. (a) What are the economies of scale ? Explain the principles of economies of scale
       as advocated by Sargant Florence.   8

   (b) What is Cost Control ? Describe the areas of Cost Control.

Section II

2x3=6

5. (a) Distinguish between the following pairs.
       (i) Linear Isoquants and Right Angled Isoquants
       (ii) Monopolistic Competition and Oligopoly
       (iii) Micro Economics and Macro Economics   2x3=6

   (b) A company wants to know
       (i) the break-even point
       (ii) the profits earned when the sales are ₹ 80,000
       (iii) the volume of the sales. when the profits are of ₹ 50,000.

Cost of Goods Sold	(in ₹)
Variable Costs	20,000
Fixed Costs	5,000
Selling Costs	
Variable Costs	5,000
Fixed Costs	2,500
Gross Profit	25,000
Net Profit	17,500
Net Sales	50,000

    (c) The life of the Machine = 10 years   2x3=6
         The Original value of the Machine : ₹ 2,00,000
         The Scrap value of the Machine : ₹ 30,000
         Find the
             (i) Rate of Depreciation
             (ii) Yearly Depreciation
             (iii) Accumulated Depreciation

6. (a) Explain Hawley's Risk Theory of Profit.   8
   (b) State and Describe different ways of the classification of markets.   8

7. (a) How a monopolist attains equilibrium in the short run as well as in the   8
       long run ?
   (b) What is a 'Feasibility Report' ? What are its main components ?   8

8. (a) What is price leadership ? Which circumstances lead to price leadership ?   8
   (b) What is an Economic Indicator ? Explain external Economic Indicators.   8

Con. 364-19.   **AB-7871**

(3 Hours)   [Total Marks : 100]

N.B.   (1)   Attempt any **Five** questions,
       (2)   All questions carry **equal** marks.
       (3)   **Statistical tables** and **graph papers** will be supplied on **request**
       (4)   Use of **Non-Programmable** calculator is **allowed.**

Q.1 A) Calculate mean, mode and standard deviation for the data below and hence find the Karl Pearsons coefficient of skewness and comment on it.

Profit (Rs. Thousand)	10-12	12-14	14-16	16-18	18-20	20-22	22-24
No. of Companies	7	15	18	20	25	10	5

     B) Mean and standard deviation of 100 items are found to be 40 and 10 respectively. If at the time of calculation two items are wrongly taken as 30 and 72 instead of 3 and 27. Find the correct mean and correct standard deviation.

Q.2 A) Marks secured by the recruits in the selection test (X) and in the proficiency test (Y) are given below. Calculate Spearman's rank correlation coefficient R.

X	44	49	52	52	47	76	65	60	63	58
Y	48	58	45	60	43	80	58	50	77	46

     B) Given Sum of X = 56, sum of Y = 40, sum of square of X = 524, sum of square of Y = 256, sum of product of X and Y = 364, n = 8. Obtain the line of regression of X on Y and the line of regression of Y on X. Also find correlation coefficient between X and Y.

Q.3 A) The probability that a man will be alive after 25 years is 3/5. The probability that his wife will be alive after 25 years is 2/3. Find the probability that i) Both will be alive, ii) Only the man will be alive iii) At least one of them will be alive.

     B) Define Poisson Law. State the conditions under which Poisson distribution exists. Also state the parameters of the Poisson distribution.

     C) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 3. Assuming the distribution to be normal find :
           i)   How many candidate score between 5 and 20.
           ii) How many candidate score more than 18.
           iii) How many candidate score less than 12.

[TURN OVER

(13)

Q.4) A) A movie producer is bringing out a new movie. In order to map out his advertising he wants to determine whether the movie will appeal most to a particular age group or whether it will appeal equally to all age groups. The producer takes a random sample from persons attending a pre-reviewing showing of the new movie and obtain following results.

Persons	Age groups		.	
	Under 20	20-39	40-59	60 and over
Liked the movie	320	80	100	200
Dislike the movie	80	20	100	100

Carry out Chi-square test and state your conclusion.

B) A chemist claims that his medicine is effective in curing 90% of the patients suffering from a particular disease. To test his claim the medicine was given to 400 patient and 345 were cured. Test his claim at 5% level of significance.

Q.5. A) Ten specimen of copper wires drawn from a large lot have the following breaking strength (in kg)

448   490   496   472   470   472   468   470   454   458

Test at the 5% level whether the mean breaking strength of the lot can be taken as 475 kg.

B) 500 articles from a factory are examined and found to be 2% defective, 800 similar articles from a second factory are found to be only 1.5% defective. Can it be reasonably concluded that the product of the first factory is inferior to that of the second factory?

Q.6 The following data show the number of claims processed per day for a group of 5 insurance company employees observed for a number of days. Test the hypothesis that the employee's mean claims per day are all the same. Use 1% level of significance.

Employee 1   15   17   14   11
Employee 2   12   10   13   17   14
Employee 3   10   14   13   15   12
Employee 4   14   9   7   10   8   7

Q.7 A) Explain how control charts are useful in Industry? Describe briefly the working of the $\overline{X}$ and R charts.

B) Define different components of time series and discuss various methods of used for measuring the trend component.

Q.8 Differentiate between the following (Any Four) :--
(a) Absolute and Relative measures of dispersion
(b) Skewness and Kurtosis
(c) Type I and Type II error
(d) Producers risk and consumers risk
(e) One way and Two way analysis of variance.
(f) Control chart for defectives and control chart for defects.

Con. 364-19.   **AB-7871**

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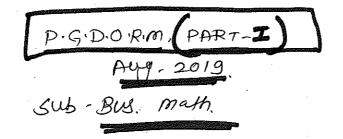
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Con. 363-19.　　　　　　　　　　　　　　　　　**AB-7818**

(3 Hours)　　　　　　　　　　　[Total Marks : 100

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    (2) **Figures** to the **right** indicate **full** marks to a question.

    (3) **Graph** paper will be supplied on **request**.

    (4) Scientific **non-programmable** handheld calculator is **allowed**.

1. (a) A tank can be filled by pipe A in 5 hours and by pipe B in 8 hours, each   **20** pump working on its own. When the tank is full and a drainage hold is open, the water is drained in 20 hours. If initially the tank was empty and someone started the two pumps together but left the drainage hole open, how long does it take for the tank to be filled ?

  (b) In a survey of university students, 64 had taken mathematics course, 94 had taken chemistry course, 58 had taken physics course, 28 had taken mathematics and physics, 26 had taken mathematics and chemistry, 22 had taken chemistry and physics course, and 14 had taken all the three courses. Find how many had taken one course only.

2. (a) Joshi purchased a house for Rs. 49,000. He spent Rs. 6,000 for repair and   **20** Rs. 5,000 for air-conditioning. If he had sold the house Rs. 58,000, find the gain or loss percentage in this transaction. (If it is needed, round your answer to the nearest hundredths).

  (b) A ball is thrown upwards from a rooftop, 80m above the ground. It will reach a maximum vertical height and then fall back to the ground. The height of the ball from the ground at time t is h, which is given by, $h = (-16t^2 + 64t + 80)$.

What is the height reached by the ball after 1 second ?

What is the maximum height reached by the ball ?

3. (a) Given that $\dfrac{9^{n-2} - 3^{2n-2}}{2^5} = 2^a 3^b$, where a and b are integers, find the value of   **20** a and express b in terms of n.

  (b) Evaluate $\displaystyle\lim_{x \to 3} \dfrac{\sqrt{(12 - x)} - x}{\sqrt{(6 + x)} - 3}$

[TURN OVER

4. (a) By using properties of determinants, show that :　　　　　20

$$\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} - \left(1-x^3\right)^2$$

(b) A soup can has a diameter of 10 cm and a height of 15 cm. What is the volume of the soup in the can if 0.5 cm of space is left at the top of the can to allow for expansion ?

5. (a) Suppose a market for commercial water purification systems has 13 buyers　　20 with the following valuations (in Rs. 1000s) from highest to lowest. What is the total valuation of the first 5 buyers ? Illustrate this as the area under the valuation curve.

(b) Find the rank of the matrix.

$$A = \begin{pmatrix} 1 & 2 & 1 & -1 \\ 9 & 5 & 2 & 2 \\ 7 & 1 & 0 & 4 \end{pmatrix}$$

6. (a) Find the area of the region bounded by the graphs of $y = x^2 + 1$ and　　20 $y = x^3$ and the vertical lines $x = 1$ and $y = 1$.

(b) Find the asymptotes of the function $f(x) = \dfrac{3x+2}{x-1}$.

7. (a) An urn B1 contains 2 white and 3 black balls and another urn B2 contains　　20 3 white and 4 black balls. One urn is selected at random and a ball is drawn from it. If the ball drawn is found black, find the probability that the urn chosen was B1.

(b) In a parking place, there are 200 vehicles, 90 of which are lorries, 50 are cars and rest are vans. If every vehicle is equally likely to leave, find probability of van leaving first.

8. (a) Find the geometric area of the following functions on the corresponding　　20 interval. $f(x) = 6x - x^3$ on $[0, 2]$

(b) Solve : 25 x $(x^2 + 3x) = 2 (2x + 6)$

(3 Hours)   [Total Marks : 100

N.B. : (1)Attempt any **five** questions.
    (2) **Figures** to the **right** indicate **full** marks to a question.
    (3) **Graph** paper will be supplied on **request**.
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