S-Y-P-G-D-O-R-M- Aug:-2018 = Adv. ope. Rese Paper. VI

Aug 2018

Con. 367-18. **RB-6199**

(3 Hours) **[Total Marks : 100**

N.B. :(1) Attempt any **five** of the following.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **statistical** table is **allowed**.
(4) Non-Programmable **calculator** is only to be used.
(5) Support your answers with diagrams / illustrations / assumptions if **required**.

(Section : Production)

1. (a) Solve the following LPP for optimal solution by Simplex method – **10**

Maximize $Z = 100x_1 + 85x_2$

Subject to 1) $6x_1 + 5x_2 \leq 60$

2) $x_1 + x_2 \leq 11$

for $x_1 + x_2 \geq 0$

(b) Write down the Dual Simplex of the following LPP – **10**

Maximize $Z = -3x_1 - x_2$

Subject to (1) $2x_1 + 3x_2 \geq 2$ (2) $x_1 + x_2 \geq 1$

Such that both $x_1, x_2 \geq 0$

2. (a) Given table shows some activities and duration in weeks. Draw required Network diagram. Show CP and find CPD. **10**

Activity	1–2	2–3	2–4	2–5	3–6	4–6	5–7	6–7
Duration	5	7	5	11	6	7	6	5

If $V_{cp} = 1.563$ approx then find the probability if the project finishes 4 weeks earlier than the normal duration.

(b) Explain the following terms with illustrations if required – **10**

(1) Gomory's Principle for IPP
(2) TF and FF in Network analysis
(3) Occurance of Multiple Solutions in LPP.

3. (a) Activities and duration in days are shown in the table. Draw Network diagram. Find CP and CPD. Also show the tabular form and find Total and Free Floats for all the activities. **10**

Activity	1–2	1–3	2–3	2–4	3–5	3–6	4–5	4–6	5–6
Days	2	3	5	6	4	9	6	4	5

(b) Solve the LPP by Revised Simplex Method :– **10**

Maximize $Z = 2x_1 + 5x_2$

Subject to (1) $3x_1 + 7x_2 \leq 400$ (2) $2x_1 + 6x_2 \leq 420$

and (3) $4x_1 + x_2 \leq 450$ if x1, x2 ≥ 0

[TURN OVER

4. (a) Solve the following LPP – **10**

Maximize $Z = 3x_1 + x_2$

Subject to (1) $x_1 - 3x_2 \leq 5$ and (2) $4x_1 - 3x_2 \leq 2$

for x_1 and $x_2 \geq 0$ and are both Integers.

(b) Solve the following by Dual Simplex Method – **10**

Minimize $Z = 3x_1 + 6x_2$

Subject to (1) $3x_1 + 2x_2 \geq 9$ and (2) $x_1 + 6x_2 \geq 9$

for both $x_1, x_2 \geq 0$.

5. Using Gomory's Principle solve the following as IPP – **20**

Maximize $Z = 200x_1 + 300x_2$

Subject to (1) $2x_1 + 4x_2 \leq 17$ (2) $3x_1 + 3x_2 \leq 15$, for $x_1, x_2 \geq 0$

Optimal solution is given as under for LPP.

Obtain the optimal solution for IPP.

C_j		200	300	0	0	B Qty	Min Ratio (RR)
Basis		x_1	x_2	s_1	s_2		
x_2	300	0	1	$\frac{1}{2}$	$-\frac{1}{3}$	$\frac{7}{2}$	–
x_1	200	1	0	$-\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{2}$	–
Z_j		200	300	50	$\frac{100}{3}$	1350	Profit
$\Delta_j = C_j - Z_j$		0	0	–50	$-\frac{100}{3}$	←	NER

6. Take the indirect cost as ₹ 90 per day. Use complete Crashing Method and determine the solutions to the given question followed by table where in some detailed information is given for certain project. **20**

Activity	**Normal Time (days)**	**Crash Time (days)**	**Normal Cost (₹)**	**Crash Cost (₹)**
1–2	3	2	90	100
1–3	4	2	250	370
2–5	5	3	150	300
3–4	6	4	100	140
3–6	8	8	400	400
4–5	3	2	120	170
5–7	5	3	200	400
6–7	3	1	200	280

Find : (1) CP and CPD

(2) Find : Normal Project completion time and Normal Cost.

(3) Find : Optimal project cost and optimal project completion time.

(4) Minimum project completion time and the corresponding project cost.

7. Solve the following LPP and bring the O.S. – **20**

Maximize $Z = 6x_1 + 8x_2$

Subject to (1) $5x_1 + 10x_2 \leq 60$

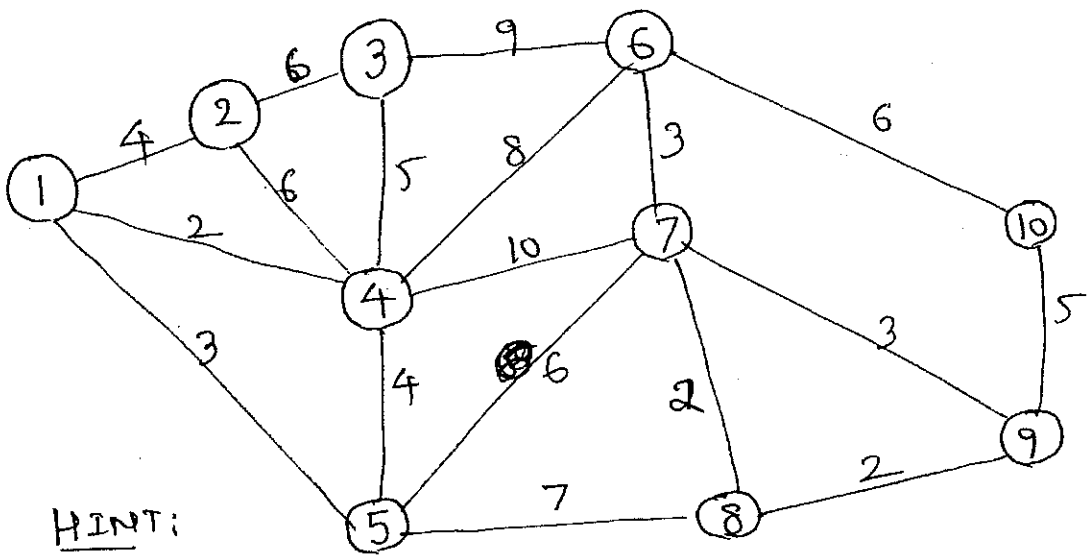
(2) $4x_1 + 4x_2 \leq 40$ for $x_1, x_2 \geq 0$

(a) Find the optimum solution for above LPP.

(b) Check of the addition of constraint.
$7x_1 + 2x_2 \leq 65$ affect optimality. Find new solution with this constraint.

(c) If new constraint $6x_1 + 3x_2 \leq 48$ be added then will there be any effect on optimality. Discuss with proper reasoning.

8. The following diagram indicates general map of certain Housing colony where circled numbers are buildings. Archial distances are shown in the '00'meters' (eg. only 6 ≈ 600 m) and are approximate. MGL wants to supply Gas Pine Line and so the company wants to minimize the total length of Gas Pine Line. Use Kruscal's Algorithm for the solution to problem. **20**



(This diagram is not to the scale. It simply a rough sketch. While answering rough sketch is only required. Explain the steps in short).

Find : Optimal length of Pine Line.

[TURN OVER

N.B. :(1) Attempt any **five** of the following.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **statistical** tables is **allowed**.
(4) Non-Programmable **calculator** is only to be used.
(5) Support your answers with diagrams / illustrations / assumptions is **required**.

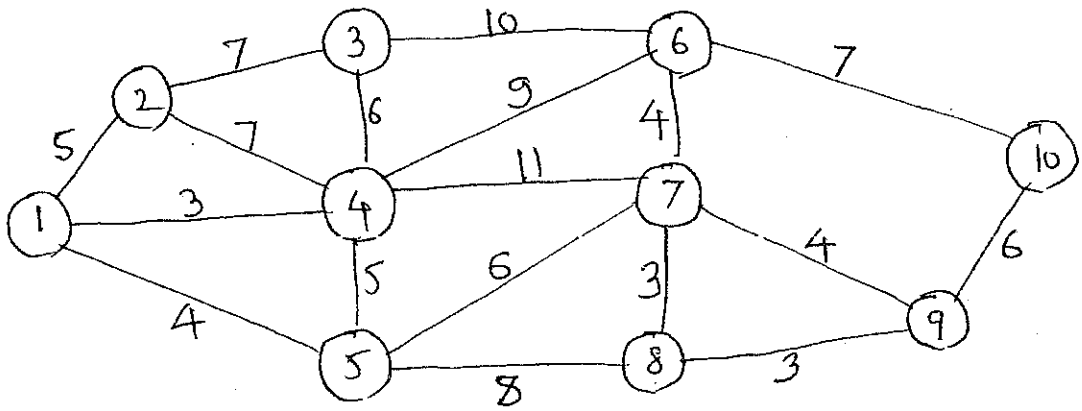
(Section : Finance)

1. (a) Explain the following with illustrations if required :– **10**
   (i) Types of Floats in Network
   (ii) Gomory's Cutting Plane principle
   (iii) Explain the use of Auxiliary or Additional variable used in solving optimization problems. Explain how it is different from slack and surplus variables ?

   (b) Write the complete algorithm of converting Primal to Dual and bring the following problems as Dual simplex problem. **10**

   Minimize $Z = 24x_1 + 30x_2$
   Subject to (1) $2x_1 + 3x_2 \geq 10$
   (2) $4x_1 + 9x_2 \geq 15$
   (3) $6x_1 + 6x_2 \geq 20$ for $x_1, x_2 \geq 0$

2. The diagram shown is a rough and not to the scale. The archial distances are in '00 m and approximate. You are required to use Kruskal's algorithm to find the optimal length of Water Pipe Line so that all the buildings can be connected to main Water Supply Line. **20**



3. (a) Find the optimal solution by Simplex Method – **10**
   Maximize $Z = 100x_1 + 60x_2$
   Subject to (1) $x_1 + x_2 \leq 11$
   (2) $6x_1 + 5x_2 \leq 60$ iff $x_1, x_2 \geq 0$

   (b) Solve the following by Dual simplex method – **10**
   Minimize $Z = 3x_1 + 6x_2$
   Subject to (1) $x_1 + 6x_2 \geq 9$
   (2) $3x_1 + 2x_2 \geq 9$ for $x_1, x_2 \geq 0$

4. (a) Given table shows some activities and duration in weeks – **10**

Activity	1–2	2–3	2–4	2–5	3–6	4–6	5–7	6–7
Duration (Weeks)	6	8	6	12	7	8	7	6

Draw Network diagram. Show CP and find CPD.
If variance of CP = 1.563 approx find the probability for project to be finished 4 weeks earlier than the normal duration.

(b) Solve LPP by Revised Simplex Method – **10**

Maximize $Z = 2x_1 + 5x_2$
Subject to (1) $2x_1 + 6x_2 \leq 420$
(2) $3x_1 + 7x_2 \leq 400$
(3) $4x_1 + x_2 \leq 450$ for $x_1, x_2 \geq 0$.

5. (a) Solve LPP by Graphical Method – **10**

Maximize $Z = -3x_1 - x_2$
Subject to (1) $2x_1 + 3x_2 \geq 2$
(2) $x_1 + x_2 \geq 1$

(b) Solve the following LPP – **10**

Maximize $Z = 3x_1 + x_2$
Subject to (1) $4x_1 - 3x_2 \leq 2$
(2) $x_1 - 3x_2 \leq 5$
Note : $x_1, x_2 \geq 0$ and are both Integers.

6. Using Gomory's Method ; Solve the following and bring the required solution – **20**

Maximize $Z = 200x_1 + 300x_2$
Subject to (1) $2x_1 + 4x_2 \leq 17$
(2) $3x_1 + 3x_2 \leq 15$ where
x_1, x_2 are Non-negative Integers
Optimum solution to LPP is as under.
Obtain Optimal Solution to IPP

C_j		200	300	0	0	B Qty	RR
Basis		x_1	x_2	s_1	s_2		
x_2	300	0	1	$\frac{1}{2}$	$-\frac{1}{3}$	$\frac{7}{2}$	–
x_1	200	1	0	$-\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{2}$	–
Z_j		200	300	50	$\frac{100}{3}$	1350	Profit
$\Delta_j = C_j - Z_j$		0	0	–50	$-\frac{100}{3}$	←	NER

[TURN OVER

7. For the Network table shows some details Indirect cost is ₹ 90 per day – **20**

Activity	1–2	1–3	1–4	2–4	2–5	3–4	4–5
Normal days	4	3	7	6	8	3	5
Crash days	3	2	5	4	7	3	3
Normal Cost (₹)	50	75	140	100	115	80	100
Crash Cost (₹)	100	150	260	180	145	80	240

(1) Draw Network diagram. Show CP and CPD.
(2) Find : Normal duration of project completion and Normal Cost
(3) Find : Optimal Project Cost with optimal duration for the project completion
(4) Find : Minimum project completion duration and the corresponding cost.

8. Some information (Necessary and Sufficient) is given in the adjoining table – **20**

Activity	1 2	1–3	2–3	2–4	3–5	3–6	4–5	4–6	5–6
Time in days	2	3	5	6	4	9	6	5	4

Answer the following questions :–
(a) Are you able to draw Network diagram ? Why ?
(b) If you are able to draw then find and show CP. Also find CPD.
(c) Either calculate or Tabulate all the types of Floats related to the project.
(d) Check if your 'CP' shown in subquestion 'b' is correct or not.
(e) What is the condition you used in verifying your Critical Path ?

N.B. :(1) Attempt any **five** of the following.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **statistical** table is **allowed**.
(4) Non-Programmable **calculator** is only to be used.
(5) Support your answers with diagrams / illustrations / assumptions is **required**.

(Section : Marketing)

1. Refer the table given as under. Necessary and sufficient Information is given. Answer the questions given below the table – **20**

Activity	1–2	1–3	2–3	2–4	3–5	3–6	4–5	4–6	5–6
Days	3	2	6	5	5	8	5	6	3

(a) Are you able to draw Network diagram ? Why ?
(b) If so, find CP and show CP. Find also CPD.
(c) Tabulate or calculate all the types of Floats.
(d) Verify if your CP Shown in diagram is correct ?
(e) State how did you verify 'CP' from the table you prepared.

2. If Maximize $Z = 200x_1 + 300x_2$ **20**
Subject to (1) $3x_1 + 3x_2 \leq 15$
(2) $2x_1 + 4x_2 \leq 17$
for $x_1, x_2 \geq 0$
and are Integers.
Optimal Solution to LPP is given –

C_j		200	300	0	0	Qty (B)	RR Min R
Basis		x_1	x_2	s_1	s_2		
x_2	200	1	0	$-\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{2}$	–
x_1	300	0	1	$\frac{1}{2}$	$-\frac{1}{3}$	$\frac{7}{2}$	–
Z_j		200	300	50	$\frac{100}{3}$	1350	Profit
$C_j - Z_j$		0	0	0	0	←	NER

Improve the above solution as IPP.

[TURN OVER

3. Consider Indirect cost as 90/- per day. **20**
Some information is given in the table

Activity	1–2	1–3	1–4	2–4	2–5	3–4	4–5
Normal days	3	2	6	5	7	2	4
Normal Cost (₹)	50	75	140	100	115	80	100
Crashing days	2	1	4	3	6	2	2
Crashing Cost (₹)	100	150	260	180	145	80	240

Answer the questions below :–

(a) Draw Network diagram show CP & Find CPD.
(b) Find : Normal duration of project completion and related Normal Cost.
(c) Find : Optimal project duration and optimal cost
(d) Find : Minimum project duration and corresponding cost at this moment.

4. (a) Solve LPP by Graphical Method : **10**

Maximize $Z = -3x_1 - x_2$

Subject to (1) $2x_1 + 3x_2 \geq 2$ and

(2) $x_1 + x_2 \geq 1$ for $x_1, x_2 \geq 0$

(b) Answer the following questions :– **10**

(1) What is Game Theory ? Write the Assumptions. Give emphasise on Dominated row and dominant column with suitable example.
(2) Discuss on use or application on various areas.

5. (a) Solve the following by simplex method – **10**

Maximize $Z = 3x_1 + x_2$

Subject to (1) $4x_1 - 3x_2 \leq 2$

(2) $x_1 - 3x_2 \leq 5$

Note : x_1, x_2 both are Non-negative integers only. State which principle you have used.

(b) Write short notes on :– **10**

(1) Gomory's cutting plane principle.
(2) TF, FF HS and TS.
(3) Occurrance of Multiple solutions in LPP.

6. (a) Solve the following by Dual Simplex Method – **10**

Minimize $Z = 3x_1 + 6x_2$

Subject to (1) $3x_1 + 2x_2 \geq 9$ and

(2) $x_1 + 6x_2 \geq 9$ if $x_1, x_2 > 0$.

(b) Solve LPP by Revised Simplex Method – **10**

Maximize $Z = 2x_1 + 5x_2$

Subject to (1) $4x_1 + x_2 \leq 450$

(2) $3x_1 + 7x_2 \leq 400$

(3) $2x_1 + 6x_2 \leq 420$ for $x_1, x_2 \geq 0$

7. (a) Refer the table given below – **10**

Activity	1–2	2–3	2–4	2–5	3–6	4–6	5–7	6–7
Duration (days)	4	6	4	10	5	6	5	4

(1) Draw Network diagram. Show CP and fined CPD.

(2) If variance of CP = 1·563 approx. find the probability for project to be finished 4 days later than the normal project duration.

(b) Find the optimum solution to given LPP using either Graphical or Simplex Method – **10**

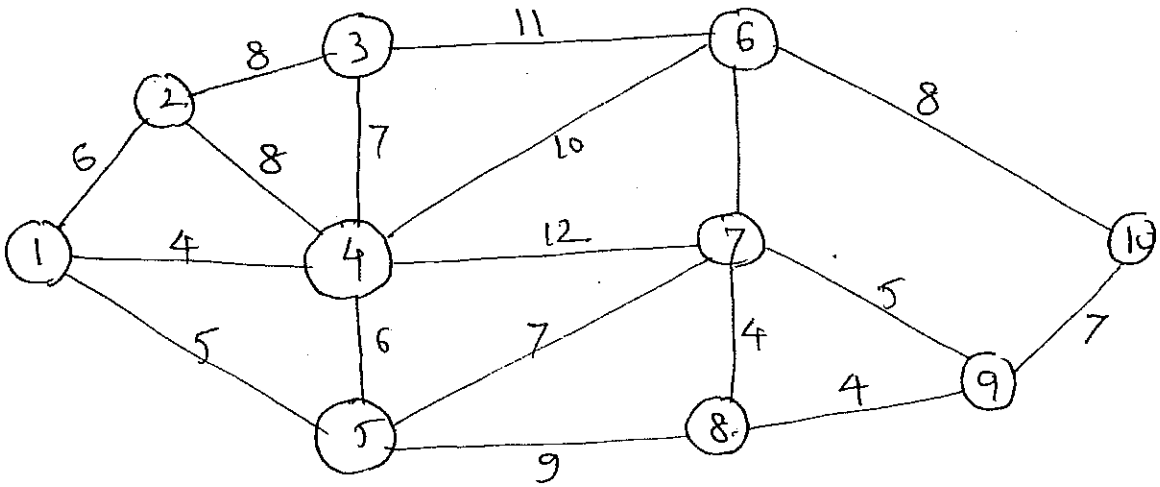
Maximize $Z = 100x_1 + 85x_2$

Subject to (1) $6x_1 + 5x_2 \leq 60$

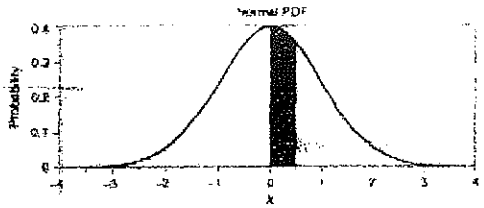
(2) $x_1 + x_2 \leq 11$ if $x_1, x_2 \geq 0$.

8. Not to the scale but a rough sketch is shown in diagram, showing the distance between buildings and amongst buildings and are given in '00 m. Zenon Cables wants to provide cable net to this Housing colony of 10 buildings. Suggest how will you reduce the total length of cable such that Network can be provided to all buildings (use Kruskal's Algorithm). **20**

Note Archial lengths are mentioned in diagram.



09



Area under the Normal Curve from 0 to X

X	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.00000	0.00399	0.00798	0.01197	0.01595	0.01994	0.02392	0.02790	0.03188	0.03586
0.1	0.03983	0.04380	0.04776	0.05172	0.05567	0.05962	0.06356	0.06749	0.07142	0.07535
0.2	0.07926	0.08317	0.08706	0.09095	0.09483	0.09871	0.10257	0.10642	0.11026	0.11409
0.3	0.11791	0.12172	0.12552	0.12930	0.13307	0.13683	0.14058	0.14431	0.14803	0.15173
0.4	0.15542	0.15910	0.16276	0.16640	0.17003	0.17364	0.17724	0.18082	0.18439	0.18793
0.5	0.19146	0.19497	0.19847	0.20194	0.20540	0.20884	0.21226	0.21566	0.21904	0.22240
0.6	0.22575	0.22907	0.23237	0.23565	0.23891	0.24215	0.24537	0.24857	0.25175	0.25490
0.7	0.25804	0.26115	0.26424	0.26730	0.27035	0.27337	0.27637	0.27935	0.28230	0.28524
0.8	0.28814	0.29103	0.29389	0.29673	0.29955	0.30234	0.30511	0.30785	0.31057	0.31327
0.9	0.31594	0.31859	0.32121	0.32381	0.32639	0.32894	0.33147	0.33398	0.33646	0.33891
1.0	0.34134	0.34375	0.34614	0.34849	0.35083	0.35314	0.35543	0.35769	0.35993	0.36214
1.1	0.36433	0.36650	0.36864	0.37076	0.37286	0.37493	0.37698	0.37900	0.38100	0.38298
1.2	0.38493	0.38686	0.38877	0.39065	0.39251	0.39435	0.39617	0.39796	0.39973	0.40147
1.3	0.40320	0.40490	0.40658	0.40824	0.40988	0.41149	0.41308	0.41466	0.41621	0.41774
1.4	0.41924	0.42073	0.42220	0.42364	0.42507	0.42647	0.42785	0.42922	0.43056	0.43189
1.5	0.43319	0.43448	0.43574	0.43699	0.43822	0.43943	0.44062	0.44179	0.44295	0.44408
1.6	0.44520	0.44630	0.44738	0.44845	0.44950	0.45053	0.45154	0.45254	0.45352	0.45449
1.7	0.45543	0.45637	0.45728	0.45818	0.45907	0.45994	0.46080	0.46164	0.46246	0.46327
1.8	0.46407	0.46485	0.46562	0.46638	0.46712	0.46784	0.46856	0.46926	0.46995	0.47062
1.9	0.47128	0.47193	0.47257	0.47320	0.47381	0.47441	0.47500	0.47558	0.47615	0.47670
2.0	0.47725	0.47778	0.47831	0.47882	0.47932	0.47982	0.48030	0.48077	0.48124	0.48169
2.1	0.48214	0.48257	0.48300	0.48341	0.48382	0.48422	0.48461	0.48500	0.48537	0.48574
2.2	0.48610	0.48645	0.48679	0.48713	0.48745	0.48778	0.48809	0.48840	0.48870	0.48899
2.3	0.48928	0.48956	0.48983	0.49010	0.49036	0.49061	0.49086	0.49111	0.49134	0.49158
2.4	0.49180	0.49202	0.49224	0.49245	0.49266	0.49286	0.49305	0.49324	0.49343	0.49361
2.5	0.49379	0.49396	0.49413	0.49430	0.49446	0.49461	0.49477	0.49492	0.49506	0.49520
2.6	0.49534	0.49547	0.49560	0.49573	0.49585	0.49598	0.49609	0.49621	0.49632	0.49643
2.7	0.49653	0.49664	0.49674	0.49683	0.49693	0.49702	0.49711	0.49720	0.49728	0.49736
2.8	0.49744	0.49752	0.49760	0.49767	0.49774	0.49781	0.49788	0.49795	0.49801	0.49807
2.9	0.49813	0.49819	0.49825	0.49831	0.49836	0.49841	0.49846	0.49851	0.49856	0.49861
3.0	0.49865	0.49869	0.49874	0.49878	0.49882	0.49886	0.49889	0.49893	0.49896	0.49900
3.1	0.49903	0.49906	0.49910	0.49913	0.49916	0.49918	0.49921	0.49924	0.49926	0.49929
3.2	0.49931	0.49934	0.49936	0.49938	0.49940	0.49942	0.49944	0.49946	0.49948	0.49950
3.3	0.49952	0.49953	0.49955	0.49957	0.49958	0.49960	0.49961	0.49962	0.49964	0.49965
3.4	0.49966	0.49968	0.49969	0.49970	0.49971	0.49972	0.49973	0.49974	0.49975	0.49976
3.5	0.49977	0.49978	0.49978	0.49979	0.49980	0.49981	0.49981	0.49982	0.49983	0.49983
3.6	0.49984	0.49985	0.49985	0.49986	0.49986	0.49987	0.49987	0.49986	0.49988	0.49989
3.7	0.49989	0.49990	0.49990	0.49990	0.49991	0.49991	0.49992	0.49992	0.49992	0.49992
3.8	0.49993	0.49993	0.49993	0.49994	0.49994	0.49994	0.49994	0.49995	0.49995	0.49995
3.9	0.49995	0.49995	0.49996	0.49996	0.49996	0.49996	0.49996	0.49996	0.49997	0.49997
4.0	0.49997	0.49997	0.49997	0.49997	0.49997	0.49997	0.49998	0.49998	0.49998	0.49998

S.Y.P.G.D.O.R.M. = Paper-VII
Aug:- 2018 = Adv. Ope. Rese.

Con. 368-18. **RB-6293**

(3 Hours) [Total Marks : 100

(Production)

N.B. :(1) Attempt any **five** questions.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **stastical** table is **allowed**.
(4) **Non Programmable** calculator is only to be used.
(5) Support your answers with diagrams / illustrations / assumptions if required.

1. "Lee–Cooper Garments" has an expert Tailor Master for Men's Shirts. Poisson Distribution with mean arrival rate of 12 per hour is followed by the number of customers who required steaching of shirts. The customers are always treated by him on the FCFS basis. Even if there is a long queue the customers are ready to wait in queue for a good service provided by master of 'Lee Cooper'. The time of 4 minutes as mean time, the Master Tailor takes to attend the customer is assumed to be exponentially distributed. Find the answers to the — **20**
   (a) The utilization parameter or Traffic Indensity.
   (b) The probability that the queuing system is idle.
   (c) The average time the 'Master' is free on 8 hr working day.
   (d) Find the probability that there are 5 customers at a point of time in the 'Lee-Cooper'.
   (e) Find the number of customers in a shop.
   (f) Find the expected number of customers waiting for master's services.
   (g) What is the expected length of the non-empty queue ?
   (h) Find a time that the customer is expected to spend in a queue.
   (i) How much time a customer should spend in the shop ?
   (j) Find the probability that the customer will spend for more than 10 minutes for Master's Service ?

2. Enlist the Common Assumptions in Job sequencing on which the most of the algorithms depend on. Write algorithms for '2 x n' and 3' x n' job sequencing. **20**

3. Write the Managerial applications of Queuing Theroy. Explain in shorts the symbols and Notations that are used in Waiting Line Model. **20**

4. What do you mean by 'Machine Interference' ? Write on management problems involving M/c Interference of varying degrees ? **20**

[TURN OVER

5. Refer the table given below : 20

Item	Annual Demand	Price Per Unit (₹)
MD I	4800	25
MD II	32000	10
MD III	680	40

Annual demand in units and price per unit is in Rs for the 3 orders. Find the Optimum order quantity if ordering cost is ₹ 15, carrying cost is 12% and only ₹ 5000/- are available per order cycle as a finance restriction. Also compare this ordering policy with the one without having the finance restriction.

6. 20

Jobs	1	2	3	4	5	6
Planting	24	20	18	28	14	18
Chiselling & Fitting	12	10	12	8	4	8
Finishing	14	12	12	10	8	8

A Company has 3 group of workers performing exclusively the jobs of either planting, Chiselling & fitting or finishing 6 different orders have been received to the company and they are marked as 1 to 6. Manager insists that jobs are to be done in the order they are received. Per hour company bear cost of ₹ 1000/-. As a consultant prove that you can reduce the total cost. Find by how much total time you can reduce. Find also the profit you have shown to the company.

7. Differentiate between Q system [two bin system] and P system [PRS] with respect to Inventory Management. **20**

8. Explain the Application of Markovian process to determine steady state requirements over the planning horizon. **20**

(Finance)

N.B. :(1) Attempt any **five** questions.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **stastical** table is **allowed**.
(4) **Non Programmable** calculator is only to be used.
(5) Support your answers with diagrams / illustrations / assumptions if required.

1. Differentiate between Q system [two bin system] and P system [PRS] w.r.t. Inventory control. **20**

2. Use Dynamic Programming principle to solve the folloiwng :— **20**

   Maximize $Z = 18x_1 + 12x_2$

   Subject to (1) $6x_1 + 4x_2 \leq 24$

   (2) $2x_1 + 5x_2 \leq 20$, $x_1, x_2 \geq 0$

3. If money is worth 16% compounded bimonthly, Find annuity amount whose annual rent is ₹ 7200/- which is payable biomonthly for 6 years. Also find the present value of it. **20**

4. Write in detail on Decision Tree and its use in Analysis. Explain with suitable example. **20**

5. 'MODI Solutions' has a uniform demand of a typical "PCB circuit" at the rate of 150 pcs per year. It buys this from a supplier at the cost of ₹ 15 per pc and cost of ordering is ₹ 12/- each time. If the stock holding cost are 20% of stock value per year, how frequently should company replenish its stocks ? Further supplier offers 6% discount on order between 200 and 799 units and 10% discount on order $\geq$ 800 units. Can the company reduces the cost by taking advantage of either of the offers [Explain Notation and symbols you used] **20**

6. Some Information is given in the table. 20

Variables & Unit of Measure	Symbols Used	Availablity		
		Nano	Meso	Supra
Price/unit (₹)	E (p) σ_p	2.50 0.20	3.00 0.60	3.50 0.70
Variable Cost per unit (₹)	E (v) σ_v	3.00 0.5	3.00 0.5	3.00 0.5
Fixed Cost (₹)	E (f) σ_f	2,80,000 5,000	2,80,000 5,000	2,80,000 5,000
Sales Qty	E (q) σ_q	3,00,000 4,000	2,40,000 3,000	1,30,000 2,000

Study the information and suggest an optimum pricing strategy based on greater expected profit and greater probability of approaching break even sales.

7. Explain Baye's Theorem with its 3 step approach in Decision Making. Give suitable example. 20

8. An annual demand in units and price per unit in ₹ for 3 different items is given in the table. Ordering cost is ₹ 15, carrying cost = 14% and only ₹ 4800 are available per order per cycle. Find optimum order Qty. under the finance restrictions and without finance restrictions. Discuss on both the types. 20

Item	ORM.α	ORM.β	ORM.γ
Annual Demand	5000	25000	900
Price Per Unit (₹)	20	7	40

(Markting)

N.B. :(1) Attempt any **five** of the following questions.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **stastical** table is **allowed**.
(4) **Non Programmable** calculator is only to be used.
(5) Support your answers with diagrams / illustrations / assumptions if required.

1. Explain Bayesian Approach in Decision making and Tree diagrams accordingly emphasizing on Baye's Theorem of 3 steps approach. **20**

2. Distinguish between Q - 2 bin system and P - PRS system w.r.t inventory control management. **20**

3. Use Dynamic Programming for the solution of **20**

   Maximize $Z = 7x_1 + 9x_2$

   Subject to (1) $4x_1 + 3x_2 \leq 12$

   (2) $2x_1 + 5x_2 \leq 15$ for $x_1, x_2 \geq 0$

4. Read the given table carefully. **20**

Item	SONA - x	SONA - y	SONA - z
Annual Demand	6000	24000	1000
Price Per Unit (₹)	24	9	24

Sufficient information is given regarding 3 items ordering cost = ₹ 15, carrying cost = 12% and Availability of finance = ₹ 5000 only per order per cycle. Find optimum order quantity for both with restrictions & without restrictions of finance. Discuss.

5. Explain what is Dynamic Programming and explain how it differs from LPP. **20**

6. Use of D. T. and Tree diagram in Decision making Analysis. **20**

[TURN OVER

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7. Some symbolic information is given in table making use of it suggest pricing strategy based on greater expected pay off & greater probability of reaching Break even sales. **20**

Variables	Notations & Symbols Used	Alternatives Available		
		Plato	**Meso**	**Lepto**
Price/unit (₹)	E (p) σ_p	4.00 0.30	4.50 0.40	5.00 0.60
Variable Cost per unit (₹)	E (v) σ_v	4.5 0.5	4.5 0.5	4.5 0.5
Fixed Cost (₹)	E (f) σ_f	4,00,000 5,000	4,00,000 5,000	4,00,000 5,000
Sales Qty in Units	E (q) σ_q	3,00,000 3,000	2,50,000 2,500	1,50,000 1,500

8. 'An Emica' has two indenpendent portfolios 'Puna' and 'Luna' available but it lacks of capital to raise to undertake both at a time. Puna = P and Luna = L. It can go for either P and stop or if P is not succesful go for 'L' and reverse can be the decision. Probability of successs of p is 0.65 and others is 0.35. Initial capital required for both the investment plan is of ₹ 12000/- and both return nothing if deal is not successful. If 'P' is successful the return = ₹ 24000 over the cost and that for 'L' will be ₹ 28000/- over cost. Draw decision tree. Show in tabular form also your suggestion for best Decision for good pay offs at various stages of T. D. **20**

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S-Y-P-G-D-O-R-M- Aug. 2018 = Paper - VIII Use of Comp. in Ope. Rese.

Con. 328–18. RB–6198

(3 Hours) [Total Marks : 100

N.B. : (1) Attempt any **five** questions.
(2) **All** questions carry **equal** Marks.
(3) **Support** answers with **relevant** examples, wherever **possible**.

1. Discuss the need for the use of computers based information system in modern business environment. **20**

2. What are the various storage (temporary and permanent) devices in a computer ? Compare them in reference to their use, advantage, disadvantage and limitations. **20**

3. (a) Define Decision Support Systems. What are its characteristics ? **10**
(b) Differentiate between MIS and DSS. **10**

4. (a) What is an operating system ? Discuss its need and also compare the various operating systems available. **10**
(b) Discuss various operating modes of an operating system. **10**

5. Write the features of C programming language and discuss the structure of a C program. **20**

6. What is DBMS and RDBMS. Differentiate between DBMS and RDBMS. **20**

7. What do you understand by simulation ? Discuss the various techniques and models of simulation. **20**

8. Write short notes on :— **20**
(a) File Processing
(b) Application Software
(c) Data Analysis
(d) Query Languages.

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S-Y.P.G-D.O.R-M. = Paper IX
Aug.-2018 = Int. App. to Oper. Resc

Con. 329–18. RB–6275

(3 Hours) [Total Marks : 100

N.B. : (1) Question **1** is **compulsory** and attempt any **four** questions from the rest.
(2) **Real life** examples will **receive** more **weightage**.
(3) Answer must be **brief** and to the **point**.
(4) **All** questions carry **equal** marks.

1. Highlight the contribution of OR in the World Class practices of companies. **20**

OR

Briefly explain the contribution of OR on the 8 pillars of Total Productive Maintenance (TPM)

2. (a) Explain the role of OR in Decision Support System and its development. **10**
(b) Discuss the relation between Decision Support System and Information Systems in reference to overall improvement of bottom line of an organisation. **10**

3. (a) Highlight the assumptions made in case of Transportation problems. Also briefly explain the steps to solve a Transportation problem. **10**
(b) Explain in brief the three OR techniques which can be used in case of deterministic, probabilistic and uncertain situations. **10**

4. (a) Highlight the differences between Strategic, Tactical and Operational decisions using real life examples. **10**
(b) What is Strategic Management ? Highlight its basic principles and its contribution to OR department. **10**

5. (a) Comment on the role of inter disciplinary team approach within an organisation to solve a problem using OR. **10**
(b) What is MIS ? Discuss its contribution to Project Management. **10**

6. Discuss how Operations Research (OR) techniques can be advantageously used for tackling problems in finance field. **20**

7. What are the various decision making areas ? List them along with their functions and also highlight the various OR or other Quantitative methods used during setup and during running an industry. **20**

8. Write short notes on any **four** of the following :— **20**
(a) Elements of MIS
(b) Contribution of OR in Road transport system
(c) Adaptive Planning
(d) Contingency Plan
(e) Benchmarking
(f) ISO 9001 : 2000

S.Y.P.G.O.B.M

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