S.Y.P.G.D.O.R.M.

July 2017

Con. 366–17. Advance operation Research - Paper III

AD–5383

(3 Hours) [Total Marks : 100

N.B. :(1) Attempt any **five** questions.
(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 if **required.**

(Section : Finance)

1. (a) Solve the LPP by Revised Simplex method – **10**

Maximize $Z = 2x_1 + 5x_2$

Subject to 1) $2x_1 + 6x_2 \leq 420$

2) $4x_1 + x_2 \leq 450$

3) $3x_1 + 7x_2 \leq 400$ for $x_1, x_2 \geq 0$

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

Maximize $Z = -3x_1 - x_2$

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

Such that : $x_1 \geq 0$ and $x_2 \geq 0$

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

Minimize $Z = 3x_1 + 6x_2$

Subject to (1) $x_1 + 6x_2 \geq 9$ (2) $3x_1 + 2x_2 \geq 10$

for $x_1, x_2 \geq 0$

(b) Solve the following LPP – **10**

Maximize $Z = 3x_1 + x_2$

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

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

3. (a) Explain the following terms with illustrations if required – **10**

(1) Total Float and Free Float
(2) Degeneracy in LPP
(3) Gomory's Cutting Plane Method.

(b) Project Activities and duration in days are shown in table – **10**

Activity	1–2	1–3	2–3	2–4	3–5	3–6	4–5	4–6	5–6
Duration (days)	3	2	5	6	4	8	5	3	4

(1) Draw Network diagram, find CPD and show CP.
(2) Show in Tabular form : EST, EFT, LST, LFT, TF, FF.

[TURN OVER

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

Maximize $Z = 100x_1 + 85x_2$

Subject to (1) $x_1 + x_2 \leq 11$

(2) $6x_1 + 5x_2 \leq 60$ for $x_1, x_2 \geq 0$

(b) Refer the table given below – Answer the questions – **10**

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

(1) Draw Network diagram. Find CPD show CP.

(2) Find the probability of completion of project by 4 weeks earlier [Vcp = Variance of cp = σ^2_{cp} if $\sigma_{cp} = 1.25$]

5. Solve the following as IPP using Gomory's Principle – **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 to above LPP is given as,

C_j		200	300	0	0	Qty (B)	RR OR Min Ratio
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

Obtain the optimum solution as IPP.

6. Some Activities and Duration in days are given. Some other related information is also given. Take Indirect cost as ₹ 80 per day. Use complete Crashing Method and determine the solutions to the questions followed by table. **20**

Activity	**Crash Time days**	**Normal Time days**	**Crash Cost ₹**	**Normal Cost ₹**
1–2	2	3	100	80
1–3	3	4	150	120
2–4	3	5	200	150
2–5	5	6	160	100
3–4	8	8	240	240
3–6	5	7	200	180
4–5	2	4	400	300
4–6	2	3	300	200
5–6	1	2	150	100

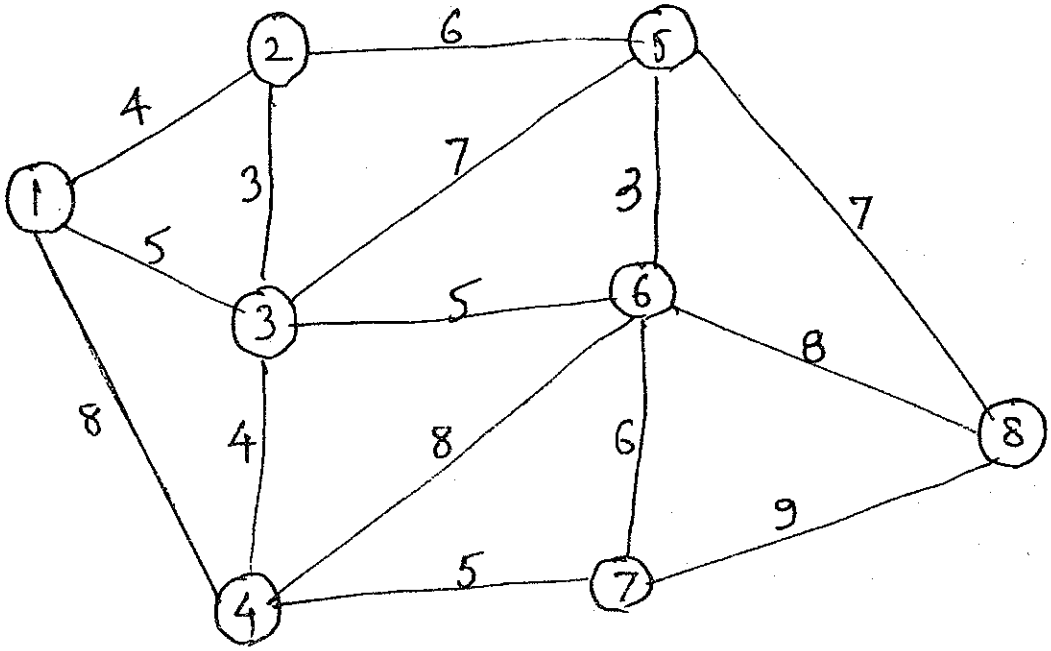
Find : (1) CP and CPD

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

(3) Find : Optimal project completion time and cost

(4) Find : Minimum projection duration and corresponding cost.

7. The given diagram is not to the scale. Arc distances are shown between nodes. Find minimum distance to travel from node to node such all nodes are connected. Solve by Kruscal's algorithm. **20**



[Note : distances are in '00 m]

8. Bring the O.S. for given LPP. **20**

Maximize $Z = 6x_1 + 8x_2$

Subject to (1) $4x_1 + 4x_2 \leq 40$ (2) $5x_1 + 10x_2 \leq 60$

for $x_1, x_2 \geq 0$

(1) Find : O·S for LPP

(2) Addition of constraint : $7x_1 + 2x_2 \leq 65$

will this constraint affect optimality. If so find new solution.

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

Discuss both with proper reasoning.

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N.B. :(1) Attempt any **five** questions.
(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 if **required**.

(Section : Production)

1. Write short notes on :– **20**
   (a) All types of Float in Network Analysis.
   (b) How are Additional variables used in LPP differ from slack and surplus variables ? Discuss.
   (c) Gomory's cutting plane.

2. Given table shows some information of Network – **20**

Activity	1–2	2–3	2–4	2–5	3–6	4–6	5–7	6–7
Days	4	6	5	10	5	6	5	4

   (1) Draw Network diagram. Show CP and find CPD.
   (2) Tabulate all types of Floats.
   (3) Variance for CP = 1.563 approx find the chances of completion of project just 3 days earlier.
   (4) Find also probability, if completion be 4 days late.

3. Solve given LPP by Simplex and check if it can be called as IPP. If it is not bring the solution as IPP. Iterate till any basis get integer value. **20**

   Maximize $Z = 100x_1 + 85x_2$
   Subject to (1) $x_1 + x_2 \leq 11$
   (2) $6x_1 + 5x_2 \leq 60$ for $x_1, x_2 \geq 0$
   and are integers.

4. Some information is given is the table. Draw Net work diagram and find CP & CPD. **20**

Activity	1–2	1–3	2–5	3–4	3–6	4–5	5–7	6–7
Normal Time (d)	4	5	6	7	9	4	6	4
Crashing Time (d)	3	3	4	5	9	3	4	2
Normal Cost (₹)	100	260	160	110	430	130	200	220
Crashing Cost (₹)	120	280	170	130	430	160	240	250

   After Crashing the complete project find the following –
   (1) Normal duration with cost
   (2) Optimal duration with optimal cost
   (3) Minimum duration with related cost. (Indirect cost ₹ 100 per day)

5. Find O.S. by Simplex **20**

Maximize $Z = 6x_1 + 8x_2$

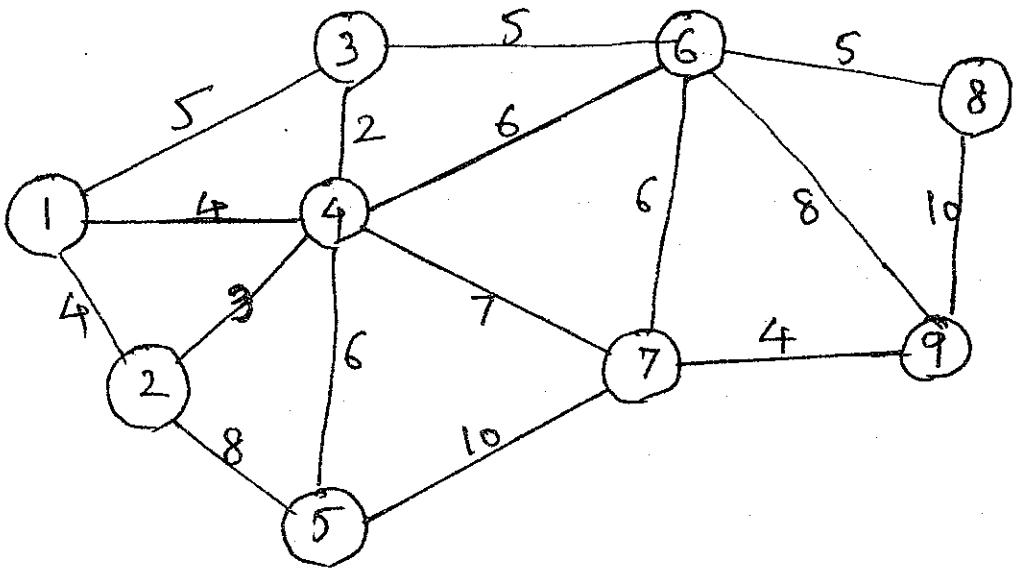
Subject to (1) $5x_1 + 10x_2 \leq 60$ and (2) $4x_1 + 4x_2 \leq 40$

for $x_1\ x_2 \geq 0$.

(1) If $7x_1 + 2x_2 \leq 65$ constraint is added will the O.S. change ? Why ?

(2) What will be the effect of additional constraint $6x_1 + 3x_2 \leq 48$ if added to the LPP ? Discuss.

6. Using Kruskal's algorithm solve for Minimum distances between and amongst all the buildings in a colony for Water supply Pipe line. Explain. **20**
[Distances are in '00 m]



7. Solve by Simplex method by obtaining Dual – **20**

Minimize $Z = 3x_1 + 6x_2$

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

for $x_1, x_2 \geq 0$

Discuss for IPP O.S. with respect to solution you obtained for Dual. Why ?

8. Solve by G. M. and verify by Simplex – **20**

Maximize $Z = 30x_1 + 20x_2$

subject to (1) $3x_1 + 7x_2 \leq 420$

(2) $4x_1 + 6x_2 \leq 480$ for $x_1, x_2 \geq 0$

[TURN OVER

N.B. :(1) Attempt any **five** questions.
(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 if **required**.

(Section : Marketing)

1. Write down the dual Simplex for the given LPP and find optimum solution to dual and there by solution to Primal. **20**

Minimize $Z = 3x_1 + 6x_2$

Subject to, (1) $2x_1 + 5x_2 \geq 15$

(2) $7x_1 + 3x_2 \geq 28$

where $x_1, x_2 \geq 0$

Write your conclusion on O.S. you obtained for Dual.

2. Explain the following :– **20**
   (a) Auxillary or Ancilliary or Additional variables used in LPP. How are they different from slack and surplus variables ?
   (b) All the types of floats in Network Analysis
   (c) Gomory's Principle.

3. Test if the given solution to LPP is optimum or not. If it is not bring the O.S. for LPP. **20**

Maximize $Z = 200x_1 + 300x_2$

Subject to (1) $2x_1 + 4x_2 \leq 17$

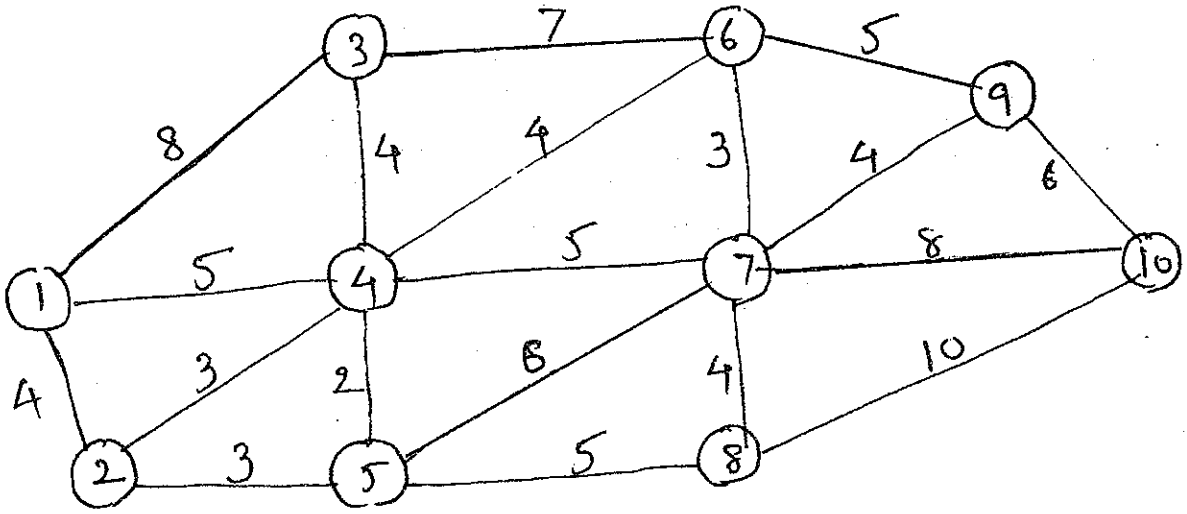
(2) $3x_1 + 3x_2 \leq 15$

$x_1, x_2 \geq 0$

C_j Basis		200 x_1	300 x_2	0 s_1	0 s_2	Q, Qty (B)	Min Ratio
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
$C_j - Z_j$		0	0	–50	$-\frac{100}{3}$	←	NER

Bring the optimal solution for IPP.

4. Arc distances are given in the diagram and are not to the scale. Distances are approximate and are in '00 m. It is a Housing colony where Telephone industry has to set up the connection. So suggest 'Telephone' how to minimize the total length of entire cable. Follow Kruscal's Algorithm. **20**



5. **20**

Activity	1–2	1–3	2–4	2–5	3–5	3–6	4–5	4–6	5–6
Duration (days)	6	5	4	8	6	3	2	4	5

Using above information

(a) Draw Network diagram. Find CP and CPD.

(b) Tabulate EST, EFT, LST, LFT

(c) Tabulate TF, FF Ind F and Interfering float.

(d) If $V_{cp} = 2{\cdot}0835$ approximately find probability that project will be completed in 21 days and 16 days respectively.

6. Solve the given LPP by Simplex Method and verify your results by G.M. **20**

Maximize $Z = 30x_1 + 20x_2$

Subject to (1) $4x_1 + 6x_2 \leq 480$ and

(2) $3x_1 + 7x_2 \leq 420$ for $x_1, x_2 \geq 0$

[TURN OVER

7. Draw Network diagram from the information given – **20**

Activity	1–2	1–3	2–4	2–5	3–4	3–5	4–5	5–6
Normal Time (d)	4	6	3	2	5	4	3	4
Crash Time (d)	3	4	2	2	4	4	1	3
Normal Cost (₹)	100	140	160	80	50	60	200	400
Crash Cost (₹)	150	170	190	80	60	60	240	420

Indirect cost is ₹ 100 per day find the following :–

(1) Normal duration and Normal cost

(2) Optimal duration and optimal cost

(3) Minimum duration with corresponding cost. Use complete crashing.

8. Maximize $Z = 6x_1 + 8x_2$ **20**

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

(2) $4x_1 + 4x_2 \leq 40$

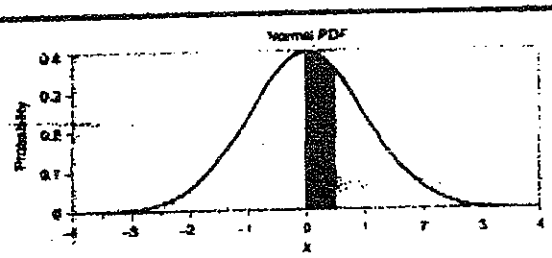
for $x_1, x_2 \geq 0$

Find optimum solution to LPP by Simplex.

If there are two more constraints available with the production unit viz.

(1) $7x_1 + 2x_2 \leq 65$ (2) $6x_1 + 3x_2 \leq 48$

Discuss on optimallity if any one extra constraint can be attached or introduced. Will there be any change on the original optimality ? Why ? (Take the additional conditions one by one and discuss.)



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	0.49988	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.

July 2017

AD–5726

Con. 369–17. Advance Operation Research II

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

(Production — Stream)

N.B. :(1) Attempt any **five** of the following questions.
(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. **20**

1. 'Ajanta Books' has a uniform demand of an item at the rate of 100 items per month. He buys from supplier at a cost of ₹ 12 per item and cost of ordering is ₹ 10 each time. If the stock-holding costs are 20% of stock value per year, how frequently should he replenish his stocks ? Further if he is offered by the supplier 5% of discount on order between 200 and 999 items and 10% of discount on orders, exceeding or equal to 1000, can the shopkeeper 'Ajanta' reduce his cost by taking advantage of either of these discounts ? (Explain the notations or symbols you used in solution)

2. The given data regarding the processing times for some jobs A to G on 3 machines M_1, M_2 and M_3. The processing order for each job is same $M_1 \rightarrow M_2 \rightarrow M_3$. **20**

Jobs	**A**	**B**	**C**	**D**	**E**	**F**	**G**
M_1	30	80	70	40	90	80	70
M_2	40	30	20	50	10	40	30
M_3	60	70	50	110	50	60	120

[Note time in minutes is given]
(1) Find the sequence that Minimizes the total Elapsed time required to complete the jobs.
(2) Find idle time of each machines.
(3) Also find job waiting time at each machine for all the jobs.

3. Write in short on all of the following :— **20**
(1) Econometric Models
(2) Write broad assumptions on which Job sequencing algorithms depend.
(3) Various notations and symbols used in Inventory management in general.

[TURN OVER

4. 'SIMCA' co-operative bank has two counters, one handling deposits only and other handling withdrawls. Past records showed that service time distributors for both deposits and withdrawals follow Negative Exponential Distribution with mean service time 3 mins per customer. Depositers arrive in a Possion fashion throughout the day with mean arrival rate of 16 per hour, Withdrawals also arrive in a possion fashion with mean arrival rate of 14 per hour. **20**
   (1) Find the average waiting time for both depositors and withdrawers.
   (2) Find the effect on the average waiting time if each counter could handle both withdrawals and deposits.

5. 'Ramdham' Transport Agency is faced with a problem of deciding the crew size for loading of trucks. Though the available space is only for one truck but the unloading / loading time can be reduced by increase in the size of the crew. Trucks arrive in purely random fashion through out the day at an average of 1.50 trucks per hour. The average service rate is one truck per hour for one loader. The service time varies definitely. Additional Loaders will increase the service rate proportionately. If the waiting cost of a truck is ₹ 25 per hour per truck. Crew members are paid ₹ 5/- per hour per person, what size of the 'crew' is best ? **20**

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

7. Write on "Management Problems involving machine interference in industry". Also elaborate the concept of Number of Machines per operator. **20**

8. Tabular form of certain information is given :— **20**

Spare Part	Annual Demand	Price per Unit (₹)
K 209	4000	28
P 313	20000	7
G 794	800	35

Table is self explanatory. Ordering cost ₹ 12, carrying cost is 12% and only ₹ 5000 are available per order per cycle. Find the optimum order quantities under finance restrictions. Also compare these ordering policy with the one without having any finance restrictions.

(Finance)

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 of required.

1. "SIMCO Producers" has a uniform demand of a typical item at the rate of 100 units per month. Company buys this from a supplier at the cost of ₹ 12 per unit and cost of ordering is ₹ 10 each time. If the stock holding cost are 20% of stock value per year, how frequently should company replenish its stocks ? Further if it is offered by the supplier 5% of discount on order between 200 and 999 units and 10% of discount on order equal and above 1000 units. Can be company reduce the cost by taking advantage of either of these two discounts ? (Explain the Notations and symbols you used in the solution) **20**

2. Solve the following LPP as a Dynamic Programming Model. **20**

   Maximize $Z = 8x_1 + 7x_2$

   Subject to (1) $5x_1 + 2x_2 \leq 15$

   (2) $2x_1 + 8x_2 \leq 8$, $x_1, x_2 \geq 0$.

3. If money is worth 18% compounded bimonthly, find the annuity amount whose annual rent is ₹ 8400 which is payable bimonthly for 5 years. Also find the present value of it. **20**

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

5. Write short notes on :— **20**
   (1) Bayesian Approach in Decision making. Emphasize on Bayes' Theorem & its 3 steps of approaches.
   (2) Decision Tree and its use in Analysis.

[TURN OVER

6. Study the given table carefully and suggest an optimum pricing strategy based on greater expected profit and greater chance of approaching break even sales. **20**

Variables & Unit of Measure	Notations & Symbols Used	Alternatives Available		
		A	B	C
Price/unit (₹)	E (p) σ_p	3.00 0.25	3.50 0.50	4.00 0.75
Variable Cost per unit (₹)	E (v) σv	2.5 0.6	2.5 0.6	2.5 0.6
Fixed Cost (₹)	E (f) σ_f	3,00,000 6,000	3,00,000 6,000	3,00,000 6,000
Sales Qty in Units	E (q) σ_q	4,00,000 3500	3,00,000 2500	2,00,000 1500

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

8. Table shows some information.

Item	Annual Demand	Price Per unit (₹)
Mkr	4000	25
DGp	20000	6
SNt	800	30

An annual demand (units) & price per unit (₹) of 3 different parts is given in the table. If ordering cost is ₹ 12, carrying cost is 12% and only ₹ 5000 are available per order per cycle, Find the optimum order quantities under the finance restrictions. Also compare these ordering policy with the one without having any finance restrictions.

9. A Businessman has two independent portfolios A & B available to him but he lacks of capital to undertake both of them simultaneously. He can go for A first and stop or if A is not successful then take B and vice-versa. The probability of success of 'A' is 0.6 while that for B is 0.4. Both the investment schemes require an initial capital outlay of ₹ 10,000/- and both return nothing if the venture is not successful. Successful completion of A will return ₹ 20,000/- (over cost) and successful completion of B will return ₹ 24,000 over cost. Draw decision tree and suggest the best strategy. Tabulate the decision alternatives. Show expected pay off at various stages in Tree Diagram. **20**

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(13)

(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. Zerom Producers have a uniform demand of an item at the rate of 100 items per month. It buys from sole supplier at a cost of ₹ 12 per pc and cost of ordering is ₹ 10 each time. If the stock holding costs are 20% of the stork value per year, how frequently it should replenish its stock. Further it is offered by the supplier 5% of discount on an order between 200 to 999 items and 10% discount on an order exceeding or equal to 1000. Can the Zerom reduce its costs by taking advantages of either of the two types of discounts ? [Explain the Notations & symbols you used in solution]. **20**

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

3. Explain what is Dynamic Programming and explain how it differes from LPP. **20**

4. Write short Notes : **20**
   (a) Decision Tree and its use in Analysis.
   (b) Bayesian Approach in decision making. Emphasize on Baye's Theorem and its 3 steps of approach.

5. Solve the given as Dynamic Programming Problem. **20**

   Maximize $Z = 8x_1 + 7x_2$

   Subject to (1) $5x_1 + 2x_2 \leq 15$

   (2) $2x + 8x_2 \leq 8$

6. Some information is given in the table. **20**

TK	4000	22
RG	18000	7
ML	700	28

[TURN OVER

(14)

Annual demand units and price per item in ₹ of 3 different items is given in the table. If ordering cost is ₹ 12, carrying cost is 12% and only ₹ 4800 are available per order per cycle. Find the optimum order quantities under the finance restrictions. Also compare these ordering policies with the one without having any finance restrictions.

7. Mr Sampat has two independent portfolios A & B available to him but he lacks of capital to undertake both of them simultaneously. He can go for 'A' first and stop or if 'A' is not successful then take 'B' and vice-versa. The probability of success of A is 0.56 while that of B is 0.44. Both the investment schemes require an initial capital out lay of ₹ 10,000 and both return nothing of the venture is unsuccessful. Successful completion of A will return ₹ 20000 / [over cost] and that for 'B' will return ₹ 24000 over cost. Draw Decision Tree and suggest the best strategy. Tabulate the decision alternatives. Show expected pay off at various stages in the Tree diagram. **20**

8. Study the given table carefully and suggest an optimum pricing strategy based on greater expected profit and greater chance of approaching brcak even sales. **20**

Variables & Unit of Measure	**Notations & Symbols Used**	**Alternatives Available**		
		Rose	**Mogra**	**Lotus**
Price/unit (₹)	E (p) σ_p	3.00 0.25	3.50 0.50	4.00 0.75
Variable Cost per unit (₹)	E (v) σ_v	2.5 0.6	2.5 0.6	2.5 0.6
Fixed Cost (₹)	E (f) σ_f	3,00,000 6,000	3,00,000 6,000	3,00,000 6,000
Sales Qty in Units	E (q) σ_q	4,00,000 3,500	3,00,000 2,500	2,00,000 1,500

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(15)

S.Y.P.G.D.O.R.M.

July 2017

Con. 371-17. Use of Computer in Operation Research

AD-5694

(Paper-VIII) (3 Hours) [Total Marks : 100

N.B. : (1) Attempt any **5** questions.
(2) **All** questions carry **equal** marks.

1. Explain different elements of dBASE. **20**

2. Explain memory organization and various storages media. **20**

3. (a) Explain DSS. **10**
(b) Explain MIS. **10**

4. (a) Explain structure and various features of 'C' language. **10**
(b) Explain EIS. **10**

5. Explain history of data processing and generations of computer. **20**

6. Explain ERD and DFD with example. **20**

7. Discuss expert systems and its limitation. **20**

8. Write short notes on followings :— **20**
(a) Discuss simulation and various techniques and models of simulations.
(b) RDBMS.
(c) Design of IS.
(d) Operating System.

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[redacted] 16

S.Y.P.G.D.O.R.M.

July 2017

Con. 372-17. AD-5409

Integrated Approach to Operation Research

(Paper-IX) (3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory** and attempt any **four** from the **rest.**
(2) Real life examples will receive more weightage.
(3) Answer must be brief and to the point.
(4) **Figures** to the **right** indicate **full** marks.

1. Contribution of OR techniques to achieve breakthrough improvements in Service Industry. **20**

OR

The impact of supply chain integration on performance: A contingency and configuration approach.

2. (a) Explain role of IS in OR. **10**
   (b) Explain application of OR in resource planning. **10**

3. (a) Explain Good practices of a world class company (OR). **10**
   (b) Explain various problems addressed by OR. **10**

4. (a) Explain various OR techniques. **10**
   (b) Highlight basic principles of strategic management and contribution of OR department in their fulfilment. **10**

5. (a) Explain various OR techniques in Marketing and Administration. **10**
   (b) Explain limitations of OR. **10**

6. (a) Explain policy planning, strategic planning and operational planning. **10**
   (b) Explain characteristics of Transportation Problem. **10**

7. Write short notes on any **four** of the following :— **20**
   (a) Six Sigma
   (b) 5S & TPM
   (c) ISO certifications
   (d) Location of operations research team.
   (e) Need of involvement of functional department in OR project.
   (f) Synergies between DSS and IS.

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(17)