**M S RAMAIAH INSTITUTE OF TECHNOLOGY**

(Autonomous Institute, affiliated to VTU)

**DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING**

|  |  |  |  |
| --- | --- | --- | --- |
| Term: | 17th Aug – 17th Dec, 2016 | Course Code: | IS 532 |
| Course: | Operation Research | Semester: | 5 |
| CIE: | Test – III | Max Marks: | 30 |
| Date: | 8/12/2016 | Time: | 2 – 3 pm |

Portions for Test: Lecture Nos. from 30 to 42 as per lesson plan.

Instructions to Candidates: Answer any two full questions. Mobiles are not allowed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl# | Question | Marks | Bloom # | COs |
| 1a | Find the initial basic feasible solution and the optimal solution for the given transportation problem using VAM’s Method.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | W1 | W2 | W3 | W4 | Capacity | | F1 | 19 | 30 | 50 | 10 | 7 | | F2 | 70 | 30 | 40 | 60 | 9 | | F3 | 40 | 8 | 70 | 20 | 18 | | Requirement | 5 | 8 | 7 | 14 |  | | 7 | Ap | 5 |
| 1b | a. Briefly discuss the basic steps in PERT/CPM techniques.  b.Construct the network diagram comprising activities *B,C,…,Q*and*N* such that the following constraints are satisfied:  *B < E, F;   C < G, L*;    *E, G < H* ;    *F, G < H;    L,H < I*;  *L < M*;   *H, M < N;*   H < J: I, J < P;    P < Q.  The notation X < Y means that the activity X must be finished before Y can begin. | 8 | Ap | 4 |
| 2a | |  |  |  |  | | --- | --- | --- | --- | | **Activity** | **Time (weeks)** | **Activity** | **Times (weeks)** | | 1-2 | 4 | 5-6 | 4 | | 1-3 | 1 | 5-7 | 8 | | 2-4 | 1 | 6-8 | 1 | | 3-4 | 1 | 7-8 | 2 | | 3-5 | 6 | 8-9 | 1 | | 4-9 | 5 | 8-10 | 8 | |  |  | 9-10 | 7 |   A project schedule has the following characteristics:  (i) Construct the PERT network  (ii) Compute E and L for each event.  (iii) Float for each activity.  (iii) Find critical path and its duration. | 9 | Ap | 4 |
| 2b | Find the initial basic feasible solution of the transportation problem using the north-west corner rule, Lowest cost entry method and the row minima method.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | D1 | D2 | D3 | D4 | Capacity | | O1 | 1 | 2 | 3 | 4 | 6 | | O2 | 4 | 3 | 2 | 0 | 8 | | O3 | 0 | 2 | 2 | 1 | 10 | | Demand | 4 | 6 | 8 | 6 |  | | 6 | Ap | 5 |
| 3a | An Engineering Project has the following activities, whose time estimates are listed below:  Activity Estimated Duration (in months)   |  |  |  |  | | --- | --- | --- | --- | | (i-j) | Optimistic | Most Likely | Pessimistic | | 1-2 | 2 | 2 | 14 | | 1-3 | 2 | 8 | 14 | | 1-4 | 4 | 4 | 16 | | 2-5 | 2 | 2 | 2 | | 3-5 | 4 | 10 | 28 | | 4-6 | 4 | 10 | 16 | | 5-6 | 6 | 12 | 30 |   (a) Draw the project network and find the critical path.  (b) Find the expected duration and variance for each activity. What is the expected project length?  (c) Calculate the variance and standard deviation of the project length. | 9 | Ap | 4 |
| 3b | The following table shows all the necessary information on the available supply to each warehouse, the requirement of each market and the unit transportation cost from each warehouse to each market.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | I | II | III | IV | Supply | | A | 5 | 2 | 4 | 3 | 22 | | B | 4 | 8 | 1 | 6 | 15 | | C | 4 | 6 | 7 | 5 | 8 | | Demand | 7 | 12 | 17 | 9 |  |   The shipping clerk has worked out the following schedule from experience: 12 units from A to II, 1 unit from A to III, 9 units from A to IV, 15 units from B to III, 7 units from C to III.  a. Check and see if the clerk has the optimal solution.  b. Find the optimal schedule and the minimum total shipping cost. | 6 | An | 5 |