NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF TEXTILE TECHNOLOGY
FINAL YEAR EXAMINATIONS, MAY 2003
PROJECT DEVELOPMENT AND MANAGEMENT– TXT 4229

ALLOWED TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES:

Attempt **ALL** questions from Section A and any **THREE** from Section B. Section A contributes 40 % while Section B contributes 60 %. It is therefore advisable for candidates to spread their time in the corresponding ratio.

SECTION A

1. What information is needed to construct the network diagram for a project? Can any project be represented as a network diagram? [3]

2. Why was the beta distribution chosen over the normal distribution for PERT/CPM analysis? [3]

3. Suppose you are trying to convince management that methods such as PERT/CPM would be useful to them. Some of the managers have voiced the following concerns:

   a. There is a tendency for technicians to handle the PERT/CPM operation, thus management will not use it often.

   b. It puts pressure on managers because every one knows where the critical path is. Managers of activities along the critical path are on the spotlight, and if their activities are delayed the cost of the delay is on their shoulders.

   c. The introduction of network planning techniques may require new communication channels and systems procedures.

   Comment on each of these concerns.
   [6]

4. (i) Briefly explain the why it is necessary to limit the number of subcontractors for a project. [2]

(ii)   Why would subcontractors for a government project want their activities on the critical path?   [2]

(iii)   Under what conditions would they try to avoid being on the critical path?   [2]

5. Define the following terms as used in project scheduling

i)   Project   [2]

ii) Break down structure   [2]

iii) Program   [2]

iv) Task   [2]

v)   Activity   [2]

vi) Work package   [2]

6.   Define 'feasibility study' of a project. Briefly explain why it is important to carry out a feasibility study before any major project is implemented.   [5]

7.   Which are the three major characteristics that a project must have for critical path scheduling to be applicable. What types of projects have been subjected to CPA?   [5]

SECTION B

8.(a)   Briefly discuss some of the questions that can be answered with program evaluation and review technique (PERT) and the critical path method (CPM).   [5]

(b) Explain why the combination of critical path method and material resource planning (CPM/MRP) is a useful scheduling tool.   [3]

(c) Table Qu. 8 describes the steps involved in the operations of a computer consulting firm. The project manager not only identified the activities, but also estimated the completion times for each activity. Identifying the activities and activity completion times for such a project is often a difficult task.

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Table Qu. 8

Activity	Description	Immediate Predecessor(s)	Time (Weeks)
A	Requirement definition	-	30
B	Computer delivery	A	10
C	Design new applications	A	8
D	Install computer	B	4
E	Design interface	C	3
F	Program modification	D, E	7
G	Program new application	D, E	6
H	Test existing application	F, G	3

(i)   Construct a network diagram for this problem   [4]
(ii)   Determine the critical path and the project completion time   [4]
(iii) Determine the probability that the project will be completed in 50 weeks [4]

9. (a) Give a detailed explanation of the three structures that can be chosen in project organisation giving advantages and disadvantages for each structure.   [10]

    (b) Explain the areas in which PERT/CPM application in project scheduling received criticism. Why is it important to know the weaknesses of PERT/CPM?   [5]

    (c) Explain the usefulness of a slack-sorted report. Is it still useful when the slacks of all project activities are positive?   [5]

10. (a) When are three – time estimates used in project scheduling?   [2]

    (b) What are the original differences between PERT and CPM.   [3]

    (c) A manufacturing concern has received a special order for a number of units of special product. A team of manufacturing engineers has prepared the information shown in Table Qu. 10

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Table Qu. 10

| | | Est activity times | | |
Job No.	Predecessor Job(s)	a	m	b
A	-	2	3	4
B	A	1	2	3
C	A	4	5	12
D	A	3	4	11
E	B	1	3	5
F	C	1	2	3
G	D	1	8	9
H	E,F	2	4	6
I	H	2	4	12
J	G	3	4	5
K	I,J	5	7	8

(a) Construct the appropriate network diagram.
(b) Determine the critical path and the expected completion time for the project.
(c) You can accomplish any one of the following at an additional cost of $1,500:
     (1) Reduce job E by two days.
     (2) Reduce job C by two days.
     (3) Reduce job G by two days.
     If you will save $1,000 for each day that the earliest completion time is reduced, which action, if any, would you choose?
(d) What is the probability that the project will take more than 30 days to complete?[15]

11 (a) What are the underlying assumptions of minimum-cost scheduling. Are they equally realistic. [5]

(b)   Your company has just received an order for a specially designed electric motor from a good customer. Nonetheless, the contract states that starting on the 13th day from now, your firm will experience a penalty of $100 per day if the job is not completed. Indirect project costs amount to $200 per day. The data on direct costs and activity precedence relationships are given in table 11.1 below:

Table 11.1

Activity	Normal Time (days)	Normal Cost ($)	Crash Time (days)	Crash Cost ($)	Immediate predecessor
A	4	1000	3	1300	NONE
B	7	1400	4	2000	NONE
C	5	2000	4	2700	NONE
D	6	1200	5	1400	A
E	3	900	2	1100	B
F	11	2500	6	3750	C
G	4	800	3	1450	D, E
H	3	300	1	500	F, G

(i) Draw the network diagram for the project   [3]
   (b) Use the minimum-cost schedule procedure to determine a good completion date
   required for the project   [12]

12(i)   When is a Weist procedure approach useful in project scheduling? List the
        steps that you would take to apply the Weist procedure.   [3]

12 (ii) The construction crew of Belmont Construction (Pvt) Ltd must frame in a new
        house. The following data is available for the project:

Activity	Immediate Predecessor	Time (days)	Workers Required (per day)
A	-	4	2
B	-	1	6
C	A	3	3
D	B	2	3
E	C, D	3	5

(a)   Draw the network diagram for the project   [2]
(b)   Disregarding capacity limitations, determine the project's critical path and
      duration.   [4]

(c)   What is the slack for each activity ?   [1]
(d)   (i) Only six construction workers are available each day. Use the Weist
           procedure to find a new schedule and draw a Gantt Chart for it.
                                                                            [5]
      (ii) What is the critical path in this schedule?   [3]
      (iii) How long will the project take now?   [2]

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APPENDIX 3 NORMAL DISTRIBUTION
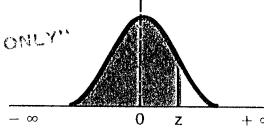
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998