Time: 3 Hours   Max. Marks: 60

N.B.: 1. Q 1 is Compulsory and carries 20 marks.
2. Attempt any *four* questions from the remaining six questions. All questions carry equal marks (10 marks each).
3. Calculators are allowed to be used.
4. Specify the question number and the sub-question number clearly that you attempt.
5. Figures to the right indicate marks.

PVs of Re. 1 at various discount rates are as follows:

Year	1	2	3	4	5	6	7	8	9	10
PVF @ 5%	0.952	0.907	0.864	0.823	0.784	0.746	0.711	0.677	0.645	0.614
PVF @ 10%	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386
PVF @ 12%	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404	0.361	0.322
PVF @ 13%	0.885	0.783	0.693	0.613	0.543	0.480	0.425	0.376	0.333	0.295
PVF @15%	.870	0.756	0.658	0.572	0.497	0.432	0.376	0.327	0.294	0.247
PVF @ 20%	0.833	0.694	0.579	0.482	0.402	0.335	0.279	0.233	0.194	0.162

Q 1. Attempt **_ALL_** sub-questions from the following

a) The time & cost estimates and precedence relationship of various activities constituting a project are given in the table below: **10**

Activity	Immediate Predecessor	Time (Months) Normal	Time (Months) Crash	Normal Cost (Rs. '00)
A	---	4	3	600
B	---	6	4	1,500
C	---	2	1	380
D	A	5	3	1,500
E	C	2	2	1,000
F	A	7	5	1,150
G	D , E , B	4	2	1,000

The increments in the cost after crashing various activities are as shown in table below:

Activity	A	B	C	D	E	F	G
Increment in cost (Rs. '00)	300	1,000	220	1,000	0	600	1,400

Indirect cost varies as follows:

Months	15	14	13	12	11	10	9	8	7	6
Cost (Rs.'00)	6,000	5,000	4,000	2,500	1,750	1,000	750	500	350	250

i. Draw an arrow diagram for the given project and find critical path & critical Time
ii. Determine the project duration which will result in minimum total project cost.

67654   **Page 1 of 5**

b) An organization is considering 3 options for a project with the expected cash flows for each option as follows: **5**

Year	Option-1	Option-2	Option-3
0	(5,00,000)	(5,00,000)	(5,00,000)
1	2,50,000	50,000	50,000
2	2,50,000	50,000	2,50,000
3	50,000	2,50,000	2,00,000
4	50,000	1,50,000	3,50,000
5	50,000	5,00,000	50,000

    i. Rank the options based on pay-back period.
    ii. Assuming the organization's cost of capital as 10%, rank the options by NPV method.

c) With a neat diagram Explain S-Curve in project management. **5**

Q 2. Attempt any **_TWO_** sub-questions from the following
    a) Write a short note on 'Debt Service Coverage Ratio' (DSCR). **5**

    b) Your company is considering two mutually exclusive projects A and B. Project A involves an outlay of Rs. 100 million and will generate an expected cash inflow of Rs. 25 million per year for 6 years. Project B calls for an outlay of Rs. 50 million which will produce an expected cash inflow of Rs.13 million per year for 6 years. The company's cost of capital is 12%. Suggest with appropriate reasons your choice of the project. **5**

    c) What is work schedule? What purpose does it serve? **5**

Q 3. Attempt any **_TWO_** sub-question from the following
    a) Following table represents data related to a project where the investment is Rs. 40,000. **5**

Year	1	2	3	4	5
PBDIT	10,000	13,000	18,000	20,000	20,000
Depreciation	2,000	2,000	2,000	2,000	2,000
Interest	3,000	3,000	3,000	2,000	1,000
Principal Repayment	----	----	----	10,000	10,000

Find out Debt Service Cover Ratio for each year, if the applicable tax rate is 30%.

    b) Following table shows the actual demand of refrigerators of over a period of past 7 weeks: **5**

Week	1	2	3	4	5	6	7
Demand	39	44	40	45	38	43	39

Using Exponential Smoothing Method (α=0.2), determine forecasted demand for 8th week. Also find MAD, MSE & MAPE. Assume $F_t = A_t$ for first week.

    c) With reference to exponential smoothing method of forecasting, discuss "Smoothing Constant" & its significance in detail. **5**

Q 4.   Attempt **either (a) or [(b) and (c)]** from the following:

a)   Compare projects A and B using the given data. Use NPV method of evaluation.   **10**

Project – A
Investment on the project   : Rs. 10,00,000/-
Life of project   : 5 years
Period of implementation   : 1 year
Cost of Capital   : 15%.

Year	1	2	3	4	5
Cash inflow	2,00,000	3,00,000	4,00,000	3,00,000	1,00,000

Project – B
Investment on the project   : Rs. 10,00,000/-
Life of project   : 5 years
Period of implementation   : 1 year
Cost of Capital   : 13%

Year	1	2	3	4	5
Cash inflow	3,00,000	4,00,000	4,00,000	3,00,000	2,00,000

b)   The demand of a product for past 12 months was observed as follows.   **5**

Month	1	2	3	4	5	6	7	8	9	10	11	12
Demand	280	288	266	295	302	310	303	328	309	315	320	332

Using 3 years moving average method, find out forecasted demand for 13th month. Also find MAD, MSE & MAPE.

c)   Explain in detail the significant difference between moving average method and weighted average method.   **5**

Q 5.   Attempt any **_ONE_** sub-question from the following

a)   Initial investment in a project is Rs. 10,00,000. Its cost of capital is 10%. The cash inflows generated by this project for next 5 years are as follows.   **10**

Year	1	2	3	4	5
Cash Inflows (Rs.)	6,00,000	3,00,000	2,00,000	5,00,000	5,00,000

Determine:
 i.   Payback period
 ii.   Post payback profitability
 iii. Net present value
 iv.   Discounted payback period
 v.   Profitability index

b)   The utility data for a network are given below: **10**

Activity	1-2	1-3	2-3	2-4	3-4	3-5	4-5	4-8	5-6	5-7	6-7	6-8	7-8
Duration (Months)	8	10	4	0	5	6	4	8	5	7	3	5	3

 i.   Draw network diagram and find Critical Path & Critical Time.
 ii.   Find EST, EFT, LST & LFT for each activity.
 iii. Find Total Float, Free Float, Independent Float & Interference Float for all activities.

67654   **Page 3 of 5**

Q 6.   Attempt any _ONE_ sub-question from the following

a)   The following data details are known about a project when the project review was   **10**
conducted.

Activity	% Completion		Cost in Rs. Lakhs	
	Scheduled	Actual	Budgeted	Actual
1	100	100	10.0	12.0
2	100	100	12.0	12.5
3	70	60	18.0	12.0
4	55	50	25.0	13.0
5	30	25	20.0	6.0
6	10	0	15.0	0
7	0	0	10.0	0
8	0	0	8.5	0
9	0	0	6.5	0
10	0	0	5.0	0

The project is expected to be completed in 35 days. Find

    i.   BCWS i.e., Budgeted cost for work scheduled

    ii.   BCWP i.e., Budgeted cost for work performed

    iii.   Cost Variance

    iv.   CPI

    v.   SPI

b)   The details of various activities of a project are given below.   **10**

Activity	Predecessor	t_o	t_m	t_p
A	----	1	3	7
B	----	1	2	4
C	A	2	4	8
D	A	2	5	11
E	B	3	6	12
F	C , D	3	7	15
G	D , E	1	4	10
H	F , G	2	6	14

    i.   Draw network diagram and find critical path & critical time.

    ii.   What will be the probability of completing the project in 20 days?

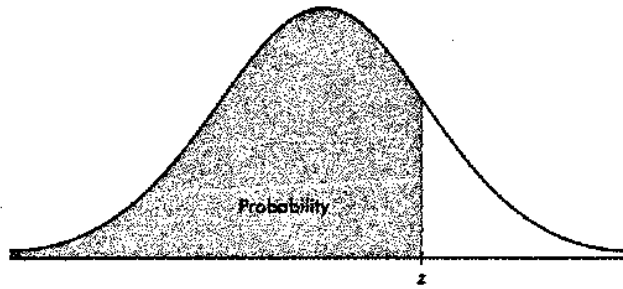   iii.   Find Total Float, Free Float, Independent Float & Interference Float for all
activities.

Q 7.   Write short notes on any _TWO_ from the following

a)   GANTT Chart   **5**

b)   Project Life Cycle   **5**

c)   Detailed Project Report   **5**

Areas under the Standard Normal Curve

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

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