(3 Hours)   **Total Marks - 60**
Instructions for students

    a. There are in all seven questions.
    b. Question No. 1 is Compulsory and carries 20 marks.
    c. Attempt any four questions out of the remaining six questions from Q2 to Q7. All questions carry 10 marks each. Each sub-question carries 5 marks.
    d. Calculators are allowed to be used.
    e. Specify the question number and the sub-question number clearly that you attempt.
    f. Figures to the right indicate marks.

Q1. Attempt *ALL* sub-questions from the following:
(a)   The following data is available for a R & D project.   **(10 Marks)**

Activity	Expected Duration (weeks)	Variance	Predecessor Activity
A	16	0:69	-
B	5	Nil	-
C	10	0.25	B
D	11	0.69	A
E	18	0.25	B
F	14	0.36	C
G	24	0.11	D
H	26	0.11	E
I	12	0.11	F

Determine the probability that project completion probability will be 85 %.

(b) Consider the data given below of a small part of project. The actual performance is measured at end of 5 months in terms of percentage actual completion and actual cost incurred. Calculate cost performance index and schedule performance index. Calculate revised project duration and cost.

Activity	preceding activity	NT	NC	AC	% actual completion
A	-	4	6	6	100
B	-	12	15	6	40
C	-	4	3	3	95
D	A	10	15	2	7
E	C	6	10	0	0
F	A	14	11	8	7
G	B , D, E	8	10	0	0

                                                           (10 Marks)

Q2. Attempt any TWO sub – questions from the following –
  (a)   Calculate Internal Rate of Return if investment is 200 & cash inflows for 2 years are 120 & 144 .
  (b)   Calculate discounted payback period in months of project with initial investment 240 and inflows 25, 55, 155 & 200. Assume rate of discounting 10 % per year
  (c)   Calculate NPV if initial investment is 500 & cash inflow for subsequent years are 50, 75, 125, 225, & 300 . Assume rate of discounting is 10% per annum.

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Q3. Attempt any TWO sub – questions from the following –
The past demand for 6 months is given of a product

Month	1	2	3	4	5	6
Demand	32	29	27	36	34	32

(a) Calculate Mean Squared Error and sales for month 7 using Moving Average method with period 3.
(b) Calculate Mean Absolute Deviation and estimated sales for month 7 using exponential smoothing method with smoothing constant 0.2.
(c) Explain Mean Absolute Percentage Error as a measure of accuracy in forecasting.

Q4. Attempt any TWO sub – questions from the following –
Consider following data of a small project given below:

Activity	preceding activity	duration(days)
A	nil	5
B	nil	7
C	A	3
D	A	3
E	B	2
F	B	2
G	D, E	2
H	F, G	3

Answer any 2 from below:
(a) Calculate critical path and project duration.
(b) Calculate Total and Free Float for all activities.
(c) Plot a Gnatt chart.

Q5. Attempt any TWO sub – questions from the following –
A company intends to produce a single product whose estimated demand in year 1 is 1700 units. It is expected to increase by 85 units each subsequent year. Estimated price for year 1 is Rs 600/unit which is expected to increase by Rs 15/unit each subsequent year. Operating expenses excluding depreciation and interest on term loan for year 1 are estimated to be Rs 178000/- which are expected to increase by Rs 20000 each subsequent year. At the beginning of project (at end of year 0) liabilities include equity capital of Rs 6 lakhs and Term loan of Rs 12 lakh. Assets include Land Rs 1 lakh and other Fixed assets Rs 17 lakh. Term loan is to be repaid in 5 years with equal annual installments and carries 12 % rate of interest charged on opening balance of that year. Other fixed assets are depreciated at 10 % per year by written down value method.
Answer any 2 from below:
(a) Calculate Equity Capital/ Term Loan for years 1 and 2.
(b) Calculate Debt Service coverage ratio (DSCR) for years 1 and 2.
(c) Calculate Interest Coverage Ratio for years 1 and 2.
Assume income tax rate is 30 %. All units produced are sold in same year. All payments and expenses realized in same year.

Q6. Attempt any TWO sub – questions from the following –

Following are the precedence requirements, normal and crash activity times, and normal and crash costs for a construction project:

Activity	Preceding Activities	Normal Time(wks)	Crash Time(wks)	Normal Cost	Crash Cost
A	----	4	2	10,000	11,000
B	A	3	2	6000	9000
C	A	2	1	4000	6000
D	B	5	3	14,000	18,000
E	B,C	1	1	9000	9000
F	C	3	2	7000	8000
G	E,F	4	2	13,000	25,000
H	D,E	4	1	11,000	18,000
I	H,G	6	5	20,000	29,000

Answer any 2 from below:
   (a) Calculate project duration.
   (b) Calculate slope of crashing of each activity.
   (c) To shorten the project by 2 weeks which tasks would be shortened and what would the final project cost be?

Q7. Attempt any TWO sub – questions from the following –
   (a) Explain different examples of Project Management in launch of new products.
   (b) Explain how uncertainties are handled in PERT approach to project planning.
   (c) Define a project stating its characteristics.

Present Value Table

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Table C: Present Value Factor of a Lump Sum (PVF) of Re 1

Interest Rate

No	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797	0.783	0.769
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712	0.693	0.675
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613	0.592
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567	0.543	0.519
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480	0.456
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452	0.425	0.400
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404	0.376	0.351
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361	0.333	0.308
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322	0.295	0.270
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287	0.261	0.237
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257	0.231	0.208
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229	0.204	0.182
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205	0.181	0.160
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183	0.160	0.140
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.188	0.163	0.141	0.123
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.170	0.146	0.125	0.108
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.153	0.130	0.111	0.095
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.138	0.116	0.098	0.083
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104	0.087	0.073
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059	0.047	0.038
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.044	0.033	0.026	0.020
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.015	0.011	0.008	0.005
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009	0.005	0.003	0.002	0.001

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Present Value Table

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Table C Contd.

Year	15%	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%	30%	40%
1	0.870	0.862	0.855	0.847	0.840	0.833	0.826	0.820	0.813	0.806	0.800	0.769	0.714
2	0.756	0.743	0.731	0.718	0.706	0.694	0.683	0.672	0.661	0.650	0.640	0.592	0.510
3	0.658	0.641	0.624	0.609	0.593	0.579	0.564	0.551	0.537	0.524	0.512	0.455	0.364
4	0.572	0.552	0.534	0.516	0.499	0.482	0.467	0.451	0.437	0.423	0.410	0.350	0.260
5	0.497	0.476	0.456	0.437	0.419	0.402	0.386	0.370	0.355	0.341	0.328	0.269	0.186
6	0.432	0.410	0.390	0.370	0.352	0.335	0.319	0.303	0.289	0.275	0.262	0.207	0.133
7	0.376	0.354	0.333	0.314	0.296	0.279	0.263	0.249	0.235	0.222	0.210	0.159	0.095
8	0.327	0.305	0.285	0.266	0.249	0.233	0.218	0.204	0.191	0.179	0.168	0.123	0.068
9	0.284	0.263	0.243	0.225	0.209	0.194	0.180	0.167	0.155	0.144	0.134	0.094	0.048
10	0.247	0.227	0.208	0.191	0.176	0.162	0.149	0.137	0.126	0.116	0.107	0.073	0.035
11	0.215	0.195	0.178	0.162	0.148	0.135	0.123	0.112	0.103	0.094	0.086	0.056	0.025
12	0.187	0.168	0.152	0.137	0.124	0.112	0.102	0.092	0.083	0.076	0.069	0.043	0.018
13	0.163	0.145	0.130	0.116	0.104	0.093	0.084	0.075	0.068	0.061	0.055	0.033	0.013
14	0.141	0.125	0.111	0.099	0.088	0.078	0.069	0.062	0.055	0.049	0.044	0.025	0.009
15	0.123	0.108	0.095	0.084	0.074	0.065	0.057	0.051	0.045	0.040	0.035	0.020	0.006
16	0.107	0.093	0.081	0.071	0.062	0.054	0.047	0.042	0.036	0.032	0.028	0.015	0.005
17	0.093	0.080	0.069	0.060	0.052	0.045	0.039	0.034	0.030	0.026	0.023	0.012	0.003
18	0.081	0.069	0.059	0.051	0.044	0.038	0.032	0.028	0.024	0.021	0.018	0.009	0.002
19	0.070	0.060	0.051	0.043	0.037	0.031	0.027	0.023	0.020	0.017	0.014	0.007	0.002
20	0.061	0.051	0.043	0.037	0.031	0.026	0.022	0.019	0.016	0.014	0.012	0.005	0.001
25	0.030	0.024	0.020	0.016	0.013	0.010	0.009	0.007	0.006	0.005	0.004	0.001	0.000
30	0.015	0.012	0.009	0.007	0.005	0.004	0.003	0.003	0.002	0.002	0.001	0.000	0.000
40	0.004	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Interest Rate

Cumulative Present Value Table

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Table D: Present Value Factor of an Annuity (PVFA) of Re 1

Year	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668	1.647
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361	2.322
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974	2.914
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517	3.433
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.231	4.111	3.998	3.889
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564	4.423	4.288
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799	4.639
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.132	4.946
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426	5.216
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687	5.453
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918	5.660
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122	5.842
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302	6.002
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606	7.191	6.811	6.462	6.142
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729	6.373
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	6.840	6.467
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366	6.938	6.550
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469	7.025	6.623
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843	7.330	6.873
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496	7.003
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.951	8.244	7.634	7.105
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915	9.042	8.304	7.675	7.133

Table D Contd.

Cumulative Present Value Table

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Interest Rate

Year	15%	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%	30%	40%
1	0.870	0.862	0.855	0.847	0.840	0.833	0.826	0.820	0.813	0.806	0.800	0.769	0.714
2	1.626	1.605	1.585	1.566	1.547	1.528	1.509	1.492	1.474	1.457	1.440	1.361	1.224
3	2.283	2.246	2.210	2.174	2.140	2.106	2.074	2.042	2.011	1.981	1.952	1.816	1.589
4	2.855	2.798	2.743	2.690	2.639	2.589	2.540	2.494	2.448	2.404	2.362	2.166	1.849
5	3.352	3.274	3.199	3.127	3.058	2.991	2.926	2.864	2.803	2.745	2.689	2.436	2.035
6	3.784	3.685	3.589	3.498	3.410	3.326	3.245	3.167	3.092	3.020	2.951	2.643	2.168
7	4.160	4.039	3.922	3.812	3.706	3.605	3.508	3.416	3.327	3.242	3.161	2.802	2.263
8	4.487	4.344	4.207	4.078	3.954	3.837	3.726	3.619	3.518	3.421	3.329	2.925	2.331
9	4.772	4.607	4.451	4.303	4.163	4.031	3.905	3.786	3.673	3.566	3.463	3.019	2.379
10	5.019	4.833	4.659	4.494	4.339	4.192	4.054	3.923	3.799	3.682	3.571	3.092	2.414
11	5.234	5.029	4.836	4.656	4.486	4.327	4.177	4.035	3.902	3.776	3.656	3.147	2.438
12	5.421	5.197	4.988	4.793	4.611	4.439	4.278	4.127	3.985	3.851	3.725	3.190	2.456
13	5.583	5.342	5.118	4.910	4.715	4.533	4.362	4.203	4.053	3.912	3.780	3.223	2.469
14	5.724	5.468	5.229	5.008	4.802	4.611	4.432	4.265	4.108	3.962	3.824	3.249	2.478
15	5.847	5.575	5.324	5.092	4.876	4.675	4.489	4.315	4.153	4.001	3.859	3.268	2.484
16	5.954	5.668	5.405	5.162	4.938	4.730	4.536	4.357	4.189	4.033	3.887	3.283	2.489
17	6.047	5.749	5.475	5.222	4.990	4.775	4.576	4.391	4.219	4.059	3.910	3.295	2.492
18	6.128	5.818	5.534	5.273	5.033	4.812	4.608	4.419	4.243	4.080	3.928	3.304	2.494
19	6.198	5.877	5.584	5.316	5.070	4.843	4.635	4.442	4.263	4.097	3.942	3.311	2.496
20	6.259	5.929	5.628	5.353	5.101	4.870	4.657	4.460	4.279	4.110	3.954	3.316	2.497
25	6.464	6.097	5.766	5.467	5.195	4.948	4.721	4.514	4.323	4.147	3.985	3.329	2.499
30	6.566	6.177	5.829	5.517	5.235	4.979	4.746	4.534	4.339	4.160	3.995	3.332	2.500
40	6.642	6.233	5.871	5.548	5.258	4.997	4.760	4.544	4.347	4.166	3.999	3.333	2.500
50	6.661	6.246	5.880	5.554	5.262	4.999	4.762	4.545	4.348	4.167	4.000	3.333	2.500

Z - Table

Table A.4:
Areas of the Standard Normal Distribution
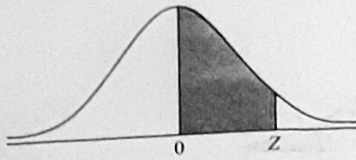
The entries in this table are the probabilities that a standard normal random variable is between 0 and z (the shaded area).

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									
4.0	0.49997									
4.5	0.499997									
5.0	0.4999997									
6.0	0.499999999									

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