



Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058



End Semester Examination/Re-Examination – May/June 2026

Program: S.Y.B.Tech (Electrical) *Sam TV*

Course Code: BS-BTE401

Course Name: Transforms, Statistics and Probability

Duration: 3 Hours

Maximum Points: 100

Semester: IV

187526

Note:

1. Attempt Any Five Questions
2. Answers to the sub questions should be grouped together

		Questions	Points	CO	BL	Mo date														
1	a	A discrete random variable X has p.d.f defined by <table border="1" style="margin: 10px auto;"> <tr> <td>X</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr> <td>P(X)</td><td>0.2</td><td>k</td><td>0.1</td><td>2k</td><td>0.1</td><td>2k</td></tr> </table> Obtain k, mean and variance.	X	-2	-1	0	1	2	3	P(X)	0.2	k	0.1	2k	0.1	2k	6	CO3	BL3	3
X	-2	-1	0	1	2	3														
P(X)	0.2	k	0.1	2k	0.1	2k														
	b	It is claimed that a random sample of 1000 tyres with a mean life of 15629 km is drawn from a population of tyres that has a mean life of 15200 km and a standard deviation of 1248 km. Test the validity of the claim at 5% level of significance.	6	CO4	BL5	6														
	c	Find the Fourier series of $f(x) = \begin{cases} x & 0 \leq x \leq \pi \\ 2\pi - x, & \pi < x \leq 2\pi \end{cases}$	8	CO4	BL3	1														
2	a	A potential buyer of light bulbs bought 50 bulbs of each of 2 brands. Upon testing the bulbs, he found that brand A had a mean life of 1282 hours with a standard deviation of 80 hours, and brand B had a mean life of 1256 hours with a standard deviation of 90 hours. Can the buyer be quite certain that the mean life of the two brands differ?	6	CO4	BL5	6														



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	b	If X is a continuous random variable with probability density function $f(x) = \begin{cases} kx, & 0 \leq x \leq 1 \\ k, & 1 \leq x \leq 2 \\ k(3-x), & 2 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases}$ Find k and $P(1.5 \leq x \leq 2.5)$	6	CO3	BL2	5																						
	c	The height in cm of fathers (x) and of the sons (y) are given below <table border="1" style="margin: 10px auto;"> <tr> <td>X</td><td>165</td><td>160</td><td>170</td><td>163</td><td>173</td><td>158</td><td>178</td><td>170</td><td>175</td><td>180</td></tr> <tr> <td>Y</td><td>173</td><td>168</td><td>173</td><td>165</td><td>175</td><td>168</td><td>173</td><td>170</td><td>173</td><td>178</td></tr> </table> Estimate the height of the son if the height of the father is 172 cm. Also estimate the height of the father if the height of the son is 173 cm. What is the coefficient of correlation between the height of fathers and sons?	X	165	160	170	163	173	158	178	170	175	180	Y	173	168	173	165	175	168	173	170	173	178	8	CO3	BL3	3
X	165	160	170	163	173	158	178	170	175	180																		
Y	173	168	173	165	175	168	173	170	173	178																		
3	a	Find the Fourier Transform of the function $f(x) = \begin{cases} 1-x^2, & x \leq 1 \\ 0, & x > 1 \end{cases}$	6	CO2	BL4	2																						
	b	Calculate the correlation coefficient between x and y from the following data $n=10, \sum x=140, \sum y=150, \sum (x-10)^2=180,$ $\sum (y-15)^2=215, \sum (x-10)(y-15)=60.$	6	CO3	BL5	3																						
	c	Find Mean and Variance of Binomial Distribution	8	CO3	BL5	4																						



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4	a	Compute spearman's rank correlation coefficient for the following data <table border="1"> <tr> <td>X</td> <td>11</td> <td>13</td> <td>20</td> <td>20</td> <td>15</td> <td>40</td> </tr> <tr> <td>Y</td> <td>12</td> <td>18</td> <td>24</td> <td>24</td> <td>49</td> <td>24</td> </tr> </table>	X	11	13	20	20	15	40	Y	12	18	24	24	49	24	6	CO3	BL5	3				
X	11	13	20	20	15	40																		
Y	12	18	24	24	49	24																		
	b	There are 80 fishes in a pool, out of which 10 are golden. 5 fishes are taken at random from the pool. What is the probability that (a) exactly 3 fishes are golden (b) At least 2 fishes are golden?	6	CO3	BL3	4																		
	c	Express the function $f(x) = \begin{cases} 1, & x < 1 \\ 0, & x > 1 \end{cases}$ as a Fourier Integral. Hence evaluate (i) $\int_0^{\infty} \left[\frac{\sin \lambda \cdot \cos \lambda x}{\lambda} \right] d\lambda$ (ii) $\int_0^{\infty} \frac{\sin \lambda \cdot \cos \lambda}{\lambda} d\lambda$	8	CO2	BL3	2																		
5	a	Find the Half Range Fourier Cosine series of $f(x) = lx - x^2, 0 \leq x \leq l$	6	CO1	BL4,5	1																		
	b	Two random samples gave the following data <table border="1"> <tr> <th>Sample No</th> <th>Size</th> <th>Mean</th> <th>Variance</th> </tr> <tr> <td>1</td> <td>1000</td> <td>67.42</td> <td>2.58</td> </tr> <tr> <td>2</td> <td>1200</td> <td>67.25</td> <td>2.5</td> </tr> </table> Is the difference between the standard deviations significant?	Sample No	Size	Mean	Variance	1	1000	67.42	2.58	2	1200	67.25	2.5	6	CO4	BL4	6						
Sample No	Size	Mean	Variance																					
1	1000	67.42	2.58																					
2	1200	67.25	2.5																					
	c	Two independent samples of 8 & 7 items gave the following results <table border="1"> <tr> <td>Sample A:</td> <td>9</td> <td>11</td> <td>13</td> <td>11</td> <td>15</td> <td>9</td> <td>12</td> <td>14</td> </tr> <tr> <td>Sample B:</td> <td>10</td> <td>12</td> <td>10</td> <td>14</td> <td>9</td> <td>8</td> <td>10</td> <td></td> </tr> </table> Examine whether the difference between the means of the samples is significant at 5% level of significance.	Sample A:	9	11	13	11	15	9	12	14	Sample B:	10	12	10	14	9	8	10		8	CO4	BL2, BL4	7
Sample A:	9	11	13	11	15	9	12	14																
Sample B:	10	12	10	14	9	8	10																	



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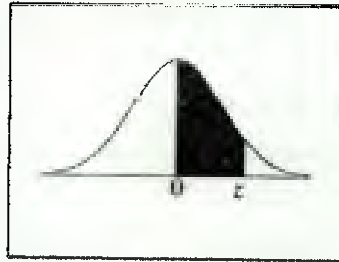
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6	a	Show that the set of functions $S = \{\sin x, \sin 2x, \sin 3x, \dots\}$ is orthogonal over $(0, 2\pi)$. Hence construct Orthonormal set.	6	CO1	BL5	1												
	b	Certain pesticide is packed into bags by a machine. A random sample of 10 bags is drawn and their contents are found to weigh (in kg) as follows 50, 49, 52, 44, 45, 48, 46, 45, 49, 45 Test if average packing can be taken to be 50 kg at 5% LOS.	6	CO4	BL3	7												
	c	For normal distribution, 30% items are below 45 and 8% items are above 64. Find the mean and variance of the normal distribution	8	CO3	BL3, BL5	5												
7	a	Fit a Poisson distribution to the following data <table border="1" style="margin: 10px auto;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>f</td> <td>122</td> <td>60</td> <td>15</td> <td>2</td> <td>1</td> </tr> </table>	x	0	1	2	3	4	f	122	60	15	2	1	6	CO3	BL2, BL3	4
x	0	1	2	3	4													
f	122	60	15	2	1													
	b	The distribution of marks obtained by a group of students may be assumed to be normal with a mean of 50 marks and a standard deviation of 15 marks. Estimate the proportion of students with marks less than 35. If 15% of the students secured more than K marks, determine K.	6	CO3	BL5	5												
	c	Find the Fourier series of $f(x) = x - x^2 \quad x \in [-1, 1]$	8	CO1	BL1, BL3													

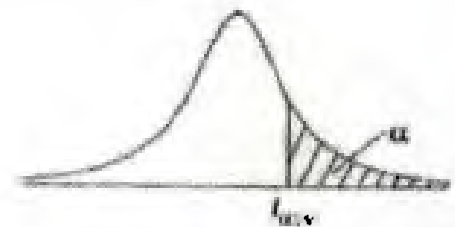
Standard Normal Distribution Table



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

Table of the Student's *t*-distribution

The table gives the values of $t_{\alpha, v}$ where
 $\Pr(T_v > t_{\alpha, v}) = \alpha$, with v degrees of freedom



$\alpha \backslash v$	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
1	3.078	6.314	12.076	31.821	63.657	318.310	636.620
2	1.886	2.920	4.303	6.965	9.925	22.326	31.598
3	1.638	2.353	3.182	4.541	5.841	10.213	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	1.319	1.714	2.069	2.500	2.807	3.485	3.767
24	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	1.296	1.671	2.000	2.390	2.660	3.232	3.460
120	1.289	1.658	1.980	2.358	2.617	3.160	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.090	3.291



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END SEMESTER EXAMINATION MAY 2026 / ~~Re-Exam June 2026~~

Program: SY B. Tech (Electrical) *Sem IV*

Duration: 3 hr

Course Code: PC-BTE401

Maximum Points: 100

Course Name: Power Generation, Transmission & Distribution

Semester: IV

Note: Question 1 is compulsory; attempt any 4 from remaining 6.

2015/26

Q. No.	Question	Pts	CO	BL	Mo. No.
1a	Find no load receiving end voltage in each of the following cases. Case 1: a 3-phase, 60 Hz overhead medium transmission line of length 130km is connected to a source of 220 kV, & has the following constants: $Z = (0.036 + j0.3) \text{ ohm/ph/km}$ and $Y = j 4.22 \times 10^{-6} \text{ Siemens/ph /km}$ [3m] Case 2: a 3-phase, 60 Hz overhead long transmission lossless line of 300 km, which is energized by 220 kV, has the following constants: $L = 0.97 \text{ mH/ph/km}$ and $C = 0.0115 \text{ micro-F/ph/km}$ [3m] In which case the receiving voltage is significantly more than sending end voltage? Why? What is this effect called as? Suggest a solution to nullify this effect and bring the receiving voltage equal to sending end voltage. Support your solution with calculation. [4m]	10	2	3, 4, 5	3
1b	Derive ABCD parameters for a medium transmission line using PI model. [5m] Draw the phasor diagram showing all currents (including capacitive currents) and voltages. [3m] Why does the capacitance is shown in shunt & inductance in series in this model?	10	2	2, 3	4
2a	Answer the following: Pin type insulators are used upto ---- voltage only. Justify your answer. [2m] An insulator string consists of three units, each having a safe working voltage of 15 kV. The ratio of self-capacitance to shunt capacitance of each unit is 8:1. Find the maximum safe working voltage of the string. Also find the string efficiency. [4m]	6	4	2, 3	6
2b	Compare Thermal, Hydro and Nuclear power plants based on following factors- 1) Initial cost, 2) Efficiency 3) Environmental /Social Impacts Or Explain the terms Feeder, distributor & service Mains in distribution system	6	1, 4	2	1



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2c	A two winding transformer is rated at 60 KVA, 200/1200 V, 60 Hz. When operating as a conventional two winding transformer at rated load, 0.8 lagging power factor, its efficiency is 96% Now this transformer is to be used as a 1400/1200V step down autotransformer, find its KVA rating and efficiency when loading is of 0.8 lagging power factor. [4m] Draw the proper winding diagram with dots indicating the currents for two winding as well as auto transformer. [2m] Why does the efficiency increase in Auto transformer? [2m]	8	2	3, 4	5
3a	Derive expression for capacitance of 3 phase line which is transposed at equal intervals. [6m] Find the capacitance of a 130km long 3 phase, 60Hz transmission line consisting of 3 conductors (one conductor for one phase), each of diameter 2cm and spaced 2.5 meter at each corner of an equilateral triangle. What will be the charging current if line is charged with 110kV voltage source? [4m]	10	4	2, 3	3
3b	Each one of you has been given a survey topic based on Indian/ Worldwide power scenario. Answer the following based on your topic. 1) Name of the topic 2) Important observations and technical details. (briefly) 3) Name the main or important websites/web portals on which the content of your survey is based.	10	1	1, 2	1
4a	Two loads connected in parallel are supplied from a single phase 240 V rms source. Both of the loads draw a total of 500 kW real power at 0.8 p.f. lagging. If one of the loads draws 100 kW at 0.96 pf leading, find the complex power of the second load.	10	2	2, 3	1
4b	Explain in detail the factors affecting the resistivity of soil. [4m] Compare neutral grounding & Earthing of equipment in terms of its need, range of current, & cause of current flow. [6m]	10	3	2, 3	7
5a	What is SIL loading of a transmission line? How do you calculate it? Starting from basic long line equations for voltage and current phasor at any point along the line i.e. $V(x)$ and $I(x)$, prove that if the line is loaded with exact SIL loading, voltage and current magnitudes remain constant over the length of the line. i.e., prove that $ V(x) = V_R $ and $ I(x) = I_R $. Draw the vector diagram showing voltage, current at receiving & sending end.	10	2	3, 4	4
5b	The ABCD constants of a 500 kV lossless long transmission line are as follows $A = D = 0.86 + j0$, $B = 0 + j130.2$, $C = j0.002$ Find sending end voltage and current when line delivers 1000 MVA at 0.8 lagging power factor at 500kV. What will be the SIL loading of this 500kV line if its characteristic impedance is 290 ohm? Find sending end voltage and current in case of this SIL loading. Compare real and reactive power in both cases of loading. Can you see any benefit of SIL loading? What is it?	10	2	3, 4, 5	4

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6a	Fill in the blank (no marks without justification. Solve any 4) 1. Skin effect is due to ---- field and it is increasing ----- of the transmission line. 2. Corona effect is due to -----. 3. Lamp is a constant ---- model whereas motor is a constant --- model. 4. If the 3 phase currents are exactly equal in magnitude as well as angle, it will be considered as ----- load 5. The main reason of touch voltage & Step voltage is ----- field in the -----	20	2,3, 4	3, 4	4, 5 7
7a	Draw a neat diagram of construction of a 3 core cable with various layers of protection around it. Explain the purpose of each layer and material used for the same.	6	4	2	3
7b	Explain with phasor diagram effect of ungrounded neutral of a synchronous generator. List out the methods of neutral grounding. Which one is mostly used for generator Why?	10	3	3, 4	7
7c	Write short note on (any one) 1) Pumped storage hydro power plant (justify why it is to be called as storage?) 2) Sag in a transmission line & various forces involved in its calculation.	4	1,4	2, 3	1, 6



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End Semester 2026 Examinations



SET B

Program: CME

Course Code: MI BT011

Course Name: Minor in Management

Principles of Management

Duration: 03 hours

Maximum Points: 100

Semester: IV

Note:

- Question 01 is compulsory
- Attempt any four questions out of remaining 06 questions
- Attempt main question and sub question together
- Draw neat charts wherever required

25/5/26

Q.No.	Questions	Points	CO	BL
Q.1.A	Describe ANY TWO of following in 250-300 words 1. Hawthorne's Experiments 2. Explain any three leadership styles with examples describing the attributes of a leader. Give examples for every leadership style. 3. Describe the key features in planning in management 4. Explain Kautilya's approach to management 5. Describe the levels of management and their functions.	20	01,2,	01
Q.2.A.	Explain different types of Organizational structures (functional, divisional, matrix, Departmentation). Compare their advantages and limitations with suitable examples.	10	02	L2
Q.2.B	Case: A retail chain is expanding into three new cities. The operations head must decide how to structure teams, whether to centralize decision-making at headquarters or give autonomy to local managers. Employees are confused about reporting lines, and duplication of tasks is occurring. Questions 1. Explain how proper organizing could resolve the confusion in reporting and duplication of tasks. 2. Recommend an organizational structure suitable for this expansion and justify your choice.	10	04	L5
Q.3.A.	State the principles of Delegation of Authority. Distinguish between	10	01	L1

	delegation of authority and Decentralization in an organisation			
Q.3.B	What is planning. Explain the importance of planning in an organisation. Describe the different types of plans that an organisation prepares for smooth functioning and to achieve the organisational goals.	10	02	L2
Q.4. A	Explain Control in management. Evaluate the process and functions of controlling in an organization.	10	03	L6
Q.4.B.	Case: Structural Challenges at Reliance Retail: Reliance Retail, one of India's largest retail chains, expanded rapidly across multiple formats—grocery, electronics, fashion, and e-commerce. As the company scaled operations across urban and rural markets, it faced significant organisational challenges. Initially, the company followed a functional structure, where departments such as procurement, marketing, HR, and operations were centrally managed. However, with rapid diversification, this structure began to create inefficiencies: • Decision-making became slow due to excessive centralization • Communication gaps emerged between departments and regional units • Duplication of efforts occurred across product categories • Regional managers lacked authority to respond to local market needs To address these issues, the company attempted to transition towards a divisional structure based on product categories, along with partial decentralization. However, this led to new challenges: • Conflicts between functional heads and divisional managers • Role ambiguity and overlap of authority • Increased operational costs due to restructuring • Difficulty in maintaining coordination across divisions The top management is now considering adopting a matrix structure to balance functional expertise and product-based focus while improving flexibility and responsiveness. Question a. Critically analyze the organisational issues faced by the company and evaluate the effectiveness of different organizational structures such as functional, divisional, and matrix). b. Recommend a suitable structure for the company with justification.	10	02	L2

Q.5. A	Discuss the process of Motivation in Management. Explain in detail any three theories of motivation that can be applied in an organisation. Highlight the advantages and disadvantages of the theories.	10	04	L5
Q.5 B.	Explain the advantages and disadvantages of centralization and decentralization. What are the factors that determine degree of decentralization?	10	01	L2
Q.6.A.	Explain the leadership theories. Trait theory, Behavioural Theory and Situational Theory.	10	03	L4
Q.6.B	What do you mean by coordination? Why is coordination called as essence of management? Discuss the various techniques and principles of coordination.	10	05	L2
Q.7A.	Write Short Notes on any Two: 1. Difference between Management and Administration 2. Span Of Management 3. Functional foremanship given by Taylor.	10	02	L2
Q.7. B	What is the importance of Directing in an organisation. How and why do directing and planning go hand in hand? Explain in detail the elements of Directing with examples.	10	03	L1



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Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Examination/ ~~Re-Examination~~, May /June 2026



Max. Marks: 100

Class: SY

Name of the Course: Introduction to Robotics

Semester: IV

Duration: 3 hr

Program: Mechanical/Electrical

Course Code: MI-BT041

Instructions:

- Question 1 is compulsory.
- Attempt any four of remaining six questions.
- Illustrate your answers with neat sketches wherever necessary.
- Assume appropriate data if required and state your reason.
- Preferably, write the answers in sequential order.

Question No		Maximum Marks	Course Outcome Number	Module No.
Q1	a. Describe the motion subsystem and its components, including manipulators, joints, and end-effectors.	5	1	1
	b. Compare Inductive vs. Capacitive proximity sensors for detecting a cardboard box inside a plastic container.	5	2	3
	c. Justify the use of a PID controller over an On-Off controller for a robotic arm joint.	5	3	5
	d. Describe methods of robot programming and explain how they are applied in industrial environments.	5	4	6
Q2	a. Explain the three subsystems of a robot, using a block diagram. If the recognition subsystem fails, predict the effect on a closed-loop vs. open-loop system.	10	3	1
	b. Evaluate the design of a Remote Center Compliance (RCC) device. Explain with a sequence diagram how it solves the peg-in-hole misalignment problem without complex programming.	10	3	2
Q3	a. Justify the selection of an Electric Actuator	10	2	2,4

	(Servo) over a Hydraulic Actuator for a SCARA robot performing delicate PCB assembly. Consider precision, force, speed, and maintenance.			
	b. Explain the characteristics of robotic manipulators with respect to: Reach, Stroke, Accuracy, Precision, Repeatability. Discuss how these parameters influence robot selection for industrial tasks.	10	4	2
Q4	a. Examine the working principle of a camera vision system. Explain the concept of Pixel and resolution. If an image is 640x480 pixels, calculate the total number of pixels and determine if it is sufficient to detect a 1mm crack on a 100mm part.	10	3	3
	b. A Hall-effect sensor and a Tachometer are both used for velocity measurement. Compare their operating principles and evaluate which is more suitable for a low-speed, high-precision joint.	10	3	3
Q5	a. Compare electric, hydraulic, and pneumatic actuators based on: i. Power-to-weight ratio ii. Controllability iii. Speed of response iv. Typical applications	10	1	4
	b. A two-finger parallel gripper holds a 2kg steel block vertically. The coefficient of friction is 0.4. Calculate the minimum gripping force required to prevent slippage (Assume $g = 9.8 \text{ m/s}^2$, Safety factor = 2). Explain how surface oil on the metal changes the requirement.	10	3	4
Q6	a. Differentiate between open-loop and closed-loop control systems using the definitions and examples. A low-cost educational robot arm is being designed for teaching basic concepts; high accuracy is not critical. Evaluate which control system is more appropriate and justify your answer. Analyze the consequence of using open-loop control in a high-precision industrial welding robot.	10	3	5
	b. Distinguish between PI, PD, and PID controllers based on: i. Steady-state error elimination ii. Stability and overshoot iii. Response speed	10	2	5

	iv. Noise sensitivity			
Q7	a. An operator uses Walk-through programming for a paint robot. Explain the role of assistive devices in this method. Compare the density of recorded points required for a smooth paint finish vs. a simple pick-and-place operation.	10	3	6,7
	b. Distinguish between WAVE, AL, and AML languages historically. Describe why most robot manufacturers still use proprietary languages instead of standard Python or C++ for motion control, despite Python being open source.	10	4	6,7



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END SEMESTER EXAMINATION MAY 2026 / ~~RE-EXAM JULY 2026~~

S.Y.
Program: B. Tech. (Electrical)

Course Code: PC-BTE402

Course Name: Measurement & Instrumentation

Duration: 3 hrs.

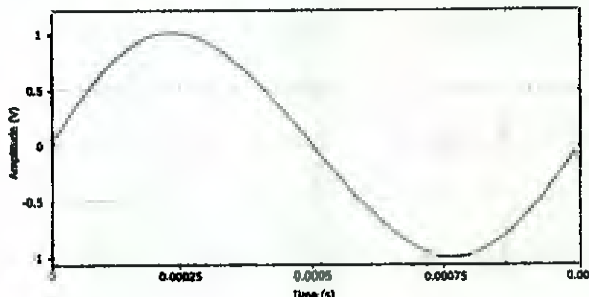
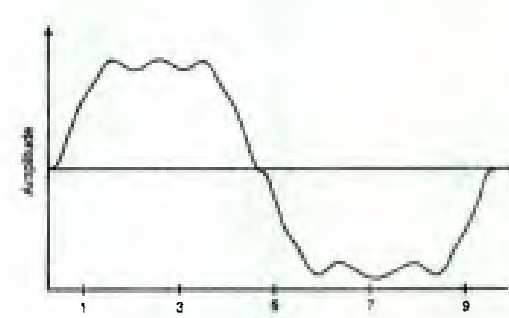
Maximum Points: 100

Semester: IV

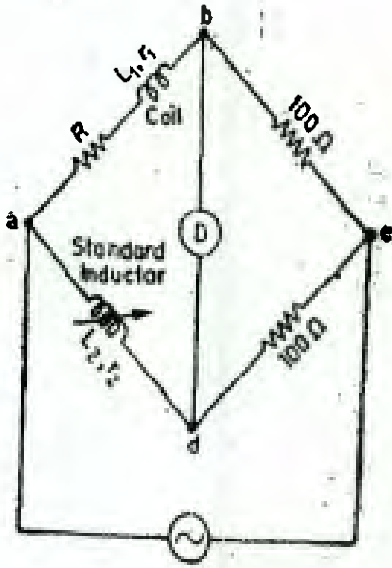
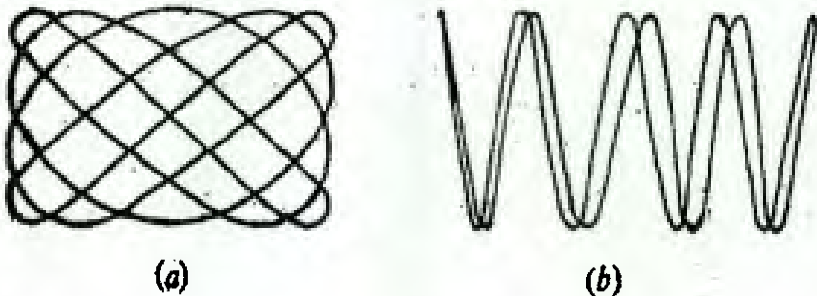
Notes:

1. Question number 1 compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams.
4. Assume suitable data if necessary.

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Q. No.	Questions	Pts.	CO	BL	Mod. No.
1. (a)	With the help of the neat diagram shown in Fig. 1 explain in detail how to measure frequency of given signal using digital frequency meter? 	10	3	L2	5
(b)	The given waveform Shown in Fig. 2 contains unwanted frequency components. Explain how these components can be identified and measured. 	10	1	L1	4

2.(a)	Explain the importance of IEC standards in electrical and electronic measurements. Discuss any two specific IEC standards relevant to measurement systems and their applications.	10	2	L2	7
2.(b)	Describe the working principle of a CRO and explain the role of the vertical and horizontal deflection systems.	10	2	L1	4
3. (a)	With the help of neat diagram explain in detail working of dual slope integrating type digital volt meter. What are the advantages of a dual slope integrating DVM over Ramp type DVM.	10	1	L1	5
3.(b)	Draw null and extreme positions of LVDT transducer to get zero, minimum and maximum output voltage.	10	1	L1	6
4. (a)	How is insulation resistance of electrical installations measured? Explain the working principle and construction of the instrument used for this purpose with a neat sketch.	10	1	L1	2
4. (b)	With the help of a neat diagram, explain in detail the most suitable method for the measurement of the level of distilled water, considering its poor electrical conductivity.	10	2	L3	6
5.(a)	Prove that $G_f = 1 + 2\nu + \frac{\Delta\rho/\rho}{\varepsilon}$	15	2	L3	6
5.(b)	Explain in detail a five point calibration method with flow chart.	05	1	L1	7
6.(a)	A 1000/5 A, 50 Hz current transformer has secondary burden comprising a non-inductive impedance of 1.6Ω. The primary winding has 1 turn. Calculate the net flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 1.5 W at full load. The magnetizing mmf is 100A.	10	2	L3	3
6.(b)	Two watt meters are connected to measure the power consumed by a 3-phase load with a power factor of 0.35. Total power consumed by the load, as indicated by the two watt meters, is 70 kW. Find the individual wattmeter readings.	05	3	L3	1
6.(c)	A moving-coil instrument whose resistance is 25Ω gives a full-scale deflection with a voltage of 25 mV. This instrument is to be used with a series multiplier to extend its range to 10 V. Calculate multiplier resistance	05	2	L2	1

	value?				
7.(a)	With the help of a neat diagram and relevant equations, explain in detail how to measure the liquid level using the inductive method . Discuss the working principle, key components, and factors affecting the measurement accuracy.	10	2	L2	6
7.(b)	A Maxwell's inductance comparison bridge is shown in Fig. 3. Arm ab consists of a coil with inductance L_1 and resistance r_1 in series with a non-inductive resistance R_1. Arm bc and cd are each a non-inductive resistance of $100\ \Omega$. Arm ad consists of standard variable inductor L_2 of resistance $52.7\ \Omega$. Balance is obtained when $L = 27.8\text{ mH}$ and $R = 4.36\ \Omega$. Find the resistance and inductance of coil in arm ab.  Fig. 3	05	2	L2	2
7.(c)	Find the frequency of the horizontal plates if the frequency applied to vertical plate is 50 Hz for the pattern shown in figure (a) and (b).  (a) (b) Fig. 4	05	1	L2	4



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END SEMESTER EXAMINATION MAY 2026 / RE-EXAM JULY 2026

Program: **S. Y. B. Tech (Electrical)** *Sum IV*

Course Code: **PC-BTE403**

Course Name: **Electrical Machines-I**

Duration: **3 Hours**

Maximum Points: **100**

Semester: **IV**

Notes:

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(1) **Question No 1 is compulsory.**

(2) **Attempt any 4 questions out of remaining six.**

Q.No.	Questions	Points	CO	BL	Module No.
Q. 1	(a) Describe the influence of highly permeable materials on the magnetic flux lines. (b) Explain the linear magnetic circuit with example. (c) Draw phasor diagram of transformer with leading p. f. load with explanation of different parameters. (d) Explain the concept of Autotransformer	05 05 05 05	01	L-1	01 03 06 07
Q. 2 (a)	Derive the expression of force as a partial derivative of stored energy with respect to position of a moving element.	10	01	L-1	03
Q. 2 (b)	A 250 V, 4 pole shunt motor has two circuit armature winding with 500 conductors. The armature circuit resistance is 0.25Ω , field resistance is 125Ω and the flux per pole is 0.02 Wb . Armature reaction is neglected. If the motor draws 14 A from the mains, then compute (a) speed and the internal torque developed, (b) the shaft power, shaft torque and efficiency with rotational losses equal to 300 watts.	10	02	L-1	05
Q. 3 (a)	What is armature reaction? Explain the main adverse effects of armature reaction. Hence, discuss any two methods to reduce armature reaction.	02+ 04+ 04	02	L-1	04
Q. 3 (b)	What are the two functions of a commutator in DC Machines? A DC shunt machine develops an open circuit e.m.f. of 250 V at 1500 r.p.m. Find its developed torque for an armature current of 20 A.	04 06	02	L-1	04



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END SEMESTER EXAMINATION MAY 2026 / ~~RE-EXAM JULY 2026~~

Q. 4 (a)	Discuss the V-I characteristics and torque-speed characteristics of D.C. shunt and series motors. State their applications.	10	02	L-1	05
Q. 4 (b)	A 250 V D.C. shunt motor runs at 1200 rpm taking 40 A. Armature resistance is 0.25Ω . If field flux decreases by 15% and armature current rises to 50 A, calculate (1) New back EMF (2) New speed.	10	02	L-1	05
Q. 5 (a)	Develop the exact equivalent circuit of a practical transformer and explain each parameter with neat equivalent circuit diagram.	10	03	L-1	06
Q. 5 (b)	A 5 kVA, 1000/200 V, 50Hz, single phase transformer gave the following test results: Open circuit test (L. V. Side): 200 V, 1.2 A, 90 W Short circuit test (H. V. Side): 50 V, 5 A, 110 W Compute the parameters of the approximate equivalent circuit referred to L.V. side. Also draw the exact equivalent circuit referred to L.V. side.	10	03	L-1	06
Q. 6 (a)	Explain different types of tap-changing transformers. Compare off-load and on-load tap changers.	10	03	L-1	07
Q. 6 (b)	A 200 kVA transformer has an efficiency of 98% at full load. If the maximum efficiency occurs at three quarters of full-load, calculate the efficiency at half load. Assume negligible magnetizing current and power factor 0.8 at all loads.	10	03	L-1	06
Q. 7 (a)	Explain transformer switching current transients and inrush current phenomenon with waveform analysis.	10	03	L-1	07
Q. 7 (b)	Illustrate the clock-method of angle designation used for phasor group representation of three phase transformers. Hence, explain Yd1 and Dy11 arrangements of transformer phasor groups.	10	03	L-1	06



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End Semester Examination/ ~~Re-Examination~~, May / June 2026



Max. Marks: 100

Class: SYBTech *Electrical* Semester: IV

Name of the Course: Signals and Systems

Duration: 3Hr

Program: BTech Electrical

Course Code : PC-BTE405

Instructions:

- 1) Question No 1 is compulsory. Solve any four from questions 2 to 7.
- 2) In the absence of any data, make suitable assumptions and justify the same.
- 3) Answer to a question should be grouped together.

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Q. No	Question	Max. Marks	Course Outcome	Mod No.
Q1a	Determine Fourier Transform of signal $x(t) = 4e^{-3t}u(t) - 2e^{-5t}u(t)$. Plot magnitude spectrum of the signal.	05	03	03
Q1b	Consider a DT system with $x[n] = \{-2, 8, 5, 7\}$ and impulse response $h[n] = \{-2, 0, 5, -6\}$. Determine output of the system. Classify the system as causal / non-causal, FIR/ IIR system. (Can use time domain/ ZT method)	05	01	01, 02/ 05, 06
Q1c	Realize a CT system having transfer function $H(s) = \frac{10}{s^2 + 7s + 10}$ (in Series or Parallel form)	05	02	07
Q1d	Calculate Laplace Transform and plot ROC of signal $x(t) = 5\sin(4t)u(t) - 2e^{3t}u(-t)$	05	04	04
Q2a	Test if the following system with input-output relation as $y[n] = 10x[-n]$ is stable, linear, time varying, causal and static?	10	01	01
Q2b	Plot signal $x(t) = e^{-6t}u(t)$. Test if it is a periodic/ aperiodic, energy/ power, even/ odd. Justify the same.	10	01	01
Q3a	Determine output of the system if $x[n] = \frac{1}{2}u[n]$ and $h[n] = \delta[n] - \frac{1}{4}\delta[n-1]$. (Use time domain method)	10	02	02
Q3b	Consider a discrete-time system whose input $x[n]$ and output $y[n]$ are related by $y[n] - \frac{1}{2}y[n-1] = x[n]$ Determine output of the system if $y[-1]=0$ and $x[n] = \frac{1}{3}u[n]$.	10	02	02

Q4a	Determine Fourier Series of a half wave rectifier output if input voltage applied to the rectifier is $V_i(t) = 4\sin(\omega t)$ with frequency $f = 50$ Hz.	10	03	03
Q4b	Consider a series RC circuit with input voltage $v_i(t)$ and output as voltage across the capacitor $v_o(t)$. Determine transfer function of the system and impulse response. Plot the frequency response of the system. Assume $R = 50\Omega$ and $C = 2$ F.	10	03	03
Q5a	Determine $x(t)$ if $X(s) = \frac{25}{(s+2)(s-5)}$. Consider all possible values of RoC.	10	04	04
Q5b	Consider a translational mechanical system described by $M \frac{d^2y}{dt^2} + B \frac{dy}{dt} + Ky = F(t)$, where $M = 1$ kg, $B = 3$ N/(m/sec) and $k = 2$ N/m. Determine response of the system if $y(0^-) = 0$ and $y'(0) = 2$. Assume a constant force of 2 N is applied at $t = 0$. Comment on the stability of the system.	10	04	04
Q6a	For a LTI system described by $y[n] - 5y[n-1] + 6y[n-2] = x[n]$ where $x[n]$ is input and $y[n]$ is output of the system, determine output of the system if $x[n] = u[n]$, $y[-1] = 3$ and $y[-2] = 2$. Determine zero state and zero input response of the system.	12	02	05 06
Q6b	For the system described in Q6a determine transfer function of the system. Plot pole zero plot and comment on the stability of the system.	08	02	05 06
Q7a	Determine ZT of $x[n] = -\left(\frac{1}{2}\right)^n u[n] + \left(\frac{1}{3}\right)^{ n }$	10	02	05
Q7b	Obtain Direct I and Direct II form realization of a system having transfer function $H(z) = \frac{25z + 30}{z(z + 2)(z - 5)}$	10	02	07

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End/~~Exam~~ Semester AY2025-2026Program: B. Tech Electrical *S.Y. Sem IV*

Duration: 3 Hrs

Course Code: PC-BTE404

Maximum Points: 100

Course Name: Microprocessor and MicrocontrollerSemester: IV

Note: Q1 is compulsory. Solve any four questions out of remaining six questions

Assume suitable data if required.

The comments should be written while writing programs/codes

Q. No	Questions	Poi nts	CO	BL	Module no
1	a> The result of signed arithmetic operation is stored in RAM location 27H. Verify if the stored result is positive or negative. If positive send high to P1.7 otherwise send low value b> Let addresses of ports A,B, C and command word register of 8255 are 400H,4001H,4002H and 4003H respectively. Four switches are connected to PB4 to PB7 of 8255. Write a program to transfer status of switches to LEDs connected to port A PA4 to PA7 of 8255. c> Write a C program to monitor P1.5 If it is high send 55H to P0 otherwise send AAH to P2 d> Write nested delay loop and find the delay generated. State the assumptions made if any. (Note Machine cycles of few instructions: MOV=1 cycle, DJNZ=2 cycles, RET=1 cycle) e> Compare Microprocessor with Microcontroller	20	1-3	2-3	1-7
2.	a> How many bytes of RAM is available with 8051? Explain its organization? b> Explain I/O ports of 8051 c> What are the functions of pins ALE, EA, RESET, TxD d> Explain functions of various internal registers available in 8051 e> With an example, explain addressing modes of 8051.	20	1-2	2	1-2
3 a	Explain 1. Bit addressable instructions	08	2	2	2-3



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End/~~Reexam~~ Semester AY2025-2026



	2. Arithmetic instructions 3. Call instructions 4. Compare instruction				
b	Write assembly language program 1. To determine number of ones in 8-bit number stored at memory location C000 2. To arrange 15 numbers stored from memory location C020 in ascending order 3. To add two 16-bit numbers stored in RAM 4. To find how many numbers out of 100 numbers stored from memory location C000 matches with hexadecimal number AA	12	2	3	4
4 a	Draw and explain external memory interfacing with 8051 to have 16Kbyte of ROM using 4Kbyte ROM chips 32Kbyte of RAM using 8Kbyte of RAM chips	10	3	3	5
b	With a neat diagram, explain interfacing of 8051 with ADC. Write a program to convert analog input to digital using 8051 interfaced with ADC	10	3	3	5
5 a	Explain 8051 internal timers. Discuss how TMOD and TCON register Design counter for counting pulses at P3.4 in 1 sec. Crystal frequency is 22MHZs.	10	2	2-3	5
b	Explain various interrupts available for 8051. Explain Interrupt Enable register. Discuss programming with external interrupts. Write assembly language program considering $\overline{INT1}$ pin is connected to switch. When it goes low it should turn on LED connected to P1.3 which is normally off	10	2	2-3	4
6 a	The 8051 needs to interface with 16 keys representing 0 to 9 numbers and A, B, C, D, E, F. alphabets. The key pressed is displayed on 7 segment display. (i) Draw interfacing diagram of 8051 with keyboard and 7 segment LED display	20	3	3	7



	(ii) Explain in detail the interfacing diagram (iii) Write assembly code to get display of key pressed on 7 segment display. Note: the key arrangement is individual's choice				
7 a	Write the steps taken for programming 8051 to receive data serially. Write assembly language program to receive data which has been sent in serial form and send it out to port 1 in parallel form. Baud rate 4800 and crystal frequency 11.0592 MHz.	10	2	3	6
b	The stepper motor is connected to port 1 of 8051. Draw and explain interfacing of the same. Write assembly language program to rotate stepper motor for 2 revolutions for full step (4 step) sequence Given 1.8 degrees/ step	10	3	3	7



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~~Examination~~ / Re-Examination, May / June 2026



Max. Marks: 100

Class: SY B *SEM* Semester: IV

Name of the Course: Introduction to Robotics

Duration: 3 hr.

Program: Mechanical/Electrical

Course Code: MI-BT041

Instructions:

- Question 1 is compulsory.
- Illustrate your answers with neat sketches wherever necessary.
- Assume appropriate data if required and state your reason.
- Preferably, write the answers in sequential order.

2017/26

Question No		Maximum Marks	Course Outcome Number	Module No.
Q1	a. Explain with a sketch the difference between Spherical (RRP) and Articulated (RRR) robot work envelopes.	5	1	2
	b. Explain why a Hydraulic actuator is preferred over Pneumatic for lifting a 500kg car chassis.	5	2	4
	c. i. If the maximum count possible for an incremental rotary encoder is 6000 pulses and the encoder has a full-scale range of $\pm 270^\circ$, calculate the angular position corresponding to a count of $n = 1250$ pulses. ii. A linear potentiometer with a total length of 172 mm and a total resistance of 7 k Ω is used to measure the displacement of a robotic arm. The potentiometer is connected to a 12V reference voltage (v_R). If the wiper moves by 85 mm, determine: (a) The output voltage (v_o), (b) The resistance between the wiper and ground.	5	3	3
	d. Describe methods of robot programming and explain how they are applied in industrial environments.	5	4	6
Q2	a. Apply the concept of Degree of Freedom (DOF) to a human arm. Explain how a 3-DOF planar robot differs from a 6-DOF spatial robot in terms of tasks they can perform.	10	1	1

	b. Evaluate the design of a Remote Center Compliance (RCC) device. Explain with a sequence diagram how it solves the peg-in-hole misalignment problem without complex programming.	10	3	2
Q3	a. Justify the selection of an Electric Actuator over a Hydraulic Actuator for a SCARA robot performing delicate PCB assembly. Consider precision, force, speed, and maintenance.	10	2	2,4
	b. Explain the characteristics of robotic manipulators with respect to: Reach, Stroke, Accuracy, Precision, Repeatability. Discuss how these parameters influence robot selection for industrial tasks.	10	4	2
Q4	a. Explain the working principle of a camera vision system. Explain the concept of Pixel and resolution. If an image is 640x480 pixels, calculate the total number of pixels and determine if it is sufficient to detect a 1mm crack on a 100mm part.	10	3	3
	b. A Hall-effect sensor and a Tachometer are both used for velocity measurement. Compare their operating principles and evaluate which is more suitable for a low-speed, high-precision joint.	10	3	3
Q5	a. Differentiate between mechanical grippers and vacuum grippers in terms of: i. Working principle ii. Surface requirements iii. Suitability for fragile objects iv. Holding mechanism	10	1	4
	b. A two-finger parallel gripper holds a 2kg steel block vertically. The coefficient of friction is 0.4. Calculate the minimum gripping force required to prevent slippage (Assume $g=9.8 \text{ m/s}^2$, Safety factor=2). Analyze how surface oil on the metal changes the requirement.	10	3	4
Q6	a. Compare open-loop and closed-loop control systems with block diagrams. Give robotic examples where each is used.	10	3	5
	b. Explain the role of control systems in robotics with emphasis on PID control. Discuss the time-domain equation of a PID controller and explain the effect of each term on system performance.	10	2	5

Q7	a. An operator uses Walk-through programming for a paint robot. Explain the role of assistive devices in this method. Compare the density of recorded points required for a smooth paint finish vs. a simple pick-and-place operation.	10	3	6,7
	b. Distinguish between WAVE, AL, and AML languages historically. Explain why most robot manufacturers still use proprietary languages instead of standard Python or C++ for motion control, despite Python being open source.	10	4	6,7



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~~Re Exam~~ ~~End Semester~~ **2026 Examinations**
SET A

Program: CME *S.Y. B. Tech Sem IV*
Course Code: MIBT011
Course Name: **Minor in Management**
Principles of Management

Duration: 03 hours
Maximum Points: 100
Semester: IV

Note:

- Question 01 is compulsory
- Attempt any four questions out of remaining 06 questions
- Attempt main question and sub question together
- Draw neat charts wherever required

2017/26

Q.No.	Questions	Points	CO	BL
Q.1.A	Explain the functions of management—planning, organizing, staffing, directing, and controlling. Illustrate how these functions are interrelated and essential for achieving organizational goals.	10	01,2	01
Q.1.B.	Write short notes on any two: 1. Leadership Traits 2. Management by Objectives (MBO) 3. Importance, advantages and Disadvantages of Forecasting 4. Difference between Authority and Power	10	01	L3
Q.2.A.	Explain different types of Organizational structures (functional, divisional, matrix). Compare their advantages and limitations with suitable examples.	10	02	L2
Q.2.B	Case: A retail chain is expanding into three new cities. The operations head must decide how to structure teams, whether to centralize decision-making at headquarters or give autonomy to local managers. Employees are confused about reporting lines, and duplication of tasks is occurring. Questions 1. Explain how proper organizing could resolve the confusion in reporting and duplication of tasks. 2. Recommend an organizational structure suitable for this expansion and justify your choice.	10	04	L5

Q.3.A.	Discuss the evolution of management thought. Compare the contributions of classical, behavioral and modern management approaches and examine their relevance in present-day organizations.	10	01	L1
Q.3.B	How will you classify the levels of Management in an organization? Describe the functions performed by different levels of Management.	10	02	L2
Q.4. A	Tata Motors has undergone significant transformation in recent years. The company faced declining sales and employee dissatisfaction. The leadership introduced new strategies, restructured teams, and implemented training programs to improve performance and morale. However, some employees resisted change due to fear of job loss and unclear communication. Questions: a Identify the leadership style adopted by the company b What organizational barriers are evident in the case? c Suggest strategies to overcome employee resistance. d Evaluate the importance of training in organizational development.	10	03	L6
Q.4.B.	What are the basic characteristics of formal and informal organization? How does informal organization differ from formal organization?	10	02	L2
Q.5. A	Explain the concept and importance of controlling as a managerial function. Discuss the process of controlling and explain how effective control contributes to organizational efficiency and achievement of objectives.	10	04	L5
Q.5 B.	Discuss Henri Fayol's principles of management . Evaluate their relevance in today's dynamic and technology-driven business environment with suitable examples.	10	01	L2
Q.6.A.	A mid-sized IT company is preparing to launch a new software product. The CEO insists on entering the market quickly, but the project manager highlights the need for detailed planning—market research, competitor analysis, budgeting, and timeline allocation. The team is divided: some want to rush, while others stress structured planning. Questions 1. Identify the importance of planning in this case. How could poor planning affect the product launch? 2. Suggest two planning tools or techniques the project manager could use to balance speed and accuracy.	10	03	L4
Q.6.B	Define motivation and explain its significance in organizational behaviour. Critically discuss the major theories of motivation with suitable examples from workplace situations.	10	05	L2
Q.7. A.	Explain in detail the roles of a manager in an organisation. Draw a neat diagram too.	10	02	L2

Q.7. B	What is the importance of Directing in an organisation. How and why do directing and planning go hand in hand? Explain in detail the elements of Directing with examples.	10	03	L1
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End/Reexam Semester AY2025-2026



Program: B. Tech *S.Y.* *Scm IV*

Duration: 3 Hrs

Course Code: PC-BTE404

Maximum Points: 100

Course Name: Microprocessor and Microcontroller

Semester: IV

Note: Q1 is compulsory. Solve any four questions out of remaining six questions

Assume suitable data if required.

21/7/21

The comments should be written while writing programs/codes

Q. No	Questions	Poi nts	CO	BL	Module no
1	a> Write assembly language program to see if RAM location 37H contain an even value, if so send it to P2, if not, make it even and send it to P2 b> Why is 8051 interfacing with 8255 required? Explain modes and command word register of 8255 c> Write C language program to toggle all bits of P0 continuously with delay d> What is embedded system. Explain characteristics of the same e> Write assembly language program to transfer contents of A, R0, R1 of bank 0 to registers B, R0, R1 of bank 1 using stack	20	1-3	2-3	1-5
2.a	(i) Identify addressing mode in each case a. MOV DPTR, #6000H b. MOV R2, DPL c. MOV A, @R0 d. MOVC A, @A+DPTR e. MOV R0, 40H (ii) How many register banks are available in RAM of 8051. Explain how the specific bank is selected. (iii) Explain in detail I/O ports of 8051	12	1-2	2-3	2-3
b	With neat block diagram, explain the architecture of 8051.	08	1-2	2	1
3 a	Explain instructions related to 1. Rotate operation 2. Logical operations	08	2	2	3



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~~End/Reexam~~ Semester AY2025-2026



	3. Jump instructions 4. Compare instruction				
b	Write assembly language program 1. To determine number of zeros in 8bit number stored at memory location C000 2. To find the smallest number out of 15 numbers stored from memory location C020 3. To add two 32bit numbers stored in RAM 4. To add six BCD numbers stored from location C000. The results are to be stored in D000 and D001.	12	2	3	4
4 a	Draw and explain external memory interfacing with 8051 to have 8Kbyte of ROM using 2k byte ROM chips 8Kbyte of RAM using 4Kbyte of RAM chips	10	3	3	5
b	Design 8051 based system to generate triangular wave.	10	2-3	3	5
5 a	Explain 8051 internal timers. Discuss how TMOD and TCON registers are used. Write a program to generate 1KHz square wave at P1.2 using timer mode 2. Assume crystal frequency is 22MHz	10	2	3	5
b	Explain how the interrupts are handled by 8051 micro-controllers. Write a program that continuously gets 8 bits from P0 and sends it to P1 while simultaneously generates a sq. wave of 200 μ sec at P2.1. Use timer 0 to create sq. wave. Assume XTAL=11.0592 MHz	10	2	3	4
6 a	The 8051 needs to interface with 9 keys representing 1 to 9 numbers. The key pressed is displayed on 7 segment display. (i) Draw interfacing diagram of 8051 with keyboard and 7 segment LED display (ii) Explain in detail the interfacing diagram (iii) Write assembly code to get display of key pressed on 7 segment display. Note: the key arrangement is individual's choice.	15	3	3	7



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End/Reexam Semester AY2025-2026



b	Why LCD display is more used than 7 segment LED display in microcontroller-based applications. Draw and explain interfacing of 8051 with LCD display.	05	3	3	6
7 a	Write the steps taken for programming 8051 to transfer data serially. Write assembly language program to take data from port 0 and transfer this data serially and continuously. Baud rate =9600. Assume crystal frequency 11.0592 MHz	10	2	3	7
b	The stepper motor is connected to port 1 of 8051. Draw and explain interfacing of the same. Write assembly language program to rotate stepper motor for 5 revolutions for full step (4 step) sequence Given 1.8 degrees/ step	10	3	3	7



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~~END SEMESTER EXAMINATION MAY 2026~~ / Re-Exam June 2026

Program: SY B. Tech (Electrical)

Duration: 3 hr

Course Code: PC-BTE401

Maximum Points: 100

Course Name: Power Generation, Transmission & Distribution

Semester: IV

Note: Question 1 is compulsory; attempt any 4 from remaining 6.

17/7/26

	Question	Pts	CO	BL	Mo. No.
a	What is-SIL loading of a transmission line? How do you calculate it? Starting from basic line equations for voltage and current phasor at any point along the line i.e. $V(x)$ and $I(x)$, prove that if the line is loaded with exact SIL loading, voltage and current magnitudes remain constant over the length of the line. i.e., prove that $ V(x) = V_R $ and $ I(x) = I_R $. Draw the vector diagram showing voltage and current at receiving & sending end.	10	2	3, 4	4
b	Find no load receiving end voltage in each of the following cases. Case 1: a 3-phase, 60 Hz overhead medium transmission line of length 150 km is connected to a source of 365 kV, & has the following constants: $Z = (0.036 + j0.3) \text{ ohm/ph/km}$ and $Y = j 4.22 \times 10^{-6} \text{ Siemens/ph /km}$ [3m] Case 2: a 3-phase, 60 Hz overhead long transmission lossless line of 300 km, which is energized by 365 kV, has the following constants: $L = 0.97 \text{ mH/ph/km}$ and $C = 0.0115 \text{ micro-F/ph/km}$ [3m] In which case the receiving voltage is significantly more than sending end voltage? Why? What is this effect called as? Suggest a solution to nullify this effect and bring the receiving voltage equal to sending end voltage. Support your solution with calculation.	10	2	3, 4, 5	3
a	Draw a neat diagram of construction of a 3 core cable with various layers of protection around it. Explain the purpose of each layer and material used for the same.	6	4	2	3
b	A two winding transformer is rated at 60 KVA, 230/1200 V, 60 Hz. When operating as a conventional two winding transformer at rated load, 0.8 lagging power factor, its efficiency is 96% Now this transformer is to be used as a 1430/1200V step down autotransformer, find its KVA rating and efficiency when loading is of 0.8 lagging power factor. [4m] Draw the proper winding diagram with dots indicating the currents for two winding as well as auto transformer. [2m] Why does the efficiency increase in Auto transformer? [2m]	8	2	3, 4	5
	Answer the following: Pin type insulators are used upto ---- voltage only. Justify your answer. [2m] An insulator string consists of three units, each having a safe working voltage of 15 kV. The ratio of self-capacitance to shunt capacitance of each unit is 8:1. Find the maximum safe working voltage of the string. Also find the string efficiency. [4m]	6	4	2, 3	6

3a	Derive expression for capacitance of 3 phase line which is transposed at equal intervals. [6m] Find the capacitance of a 100km long 3 phase, 50Hz transmission line consisting of 3 conductors (one conductor for one phase), each of diameter 2cm and spaced 2.5 meter at each corner of an equilateral triangle. What will be the charging current if line is charged with 110kV voltage source? [4m]	10	4	2, 3	3
3b	Explain in detail the factors affecting the resistivity of soil. [4m] Compare neutral grounding & Earthing of equipment in terms of its need, range of current, & cause of current flow. [6m]	10	3	2, 3	7
4a	Derive ABCD parameters for a medium transmission line using PI model. [5m] Draw the phasor diagram showing all currents (including capacitive currents) and voltages. [3m] Why does the capacitance is shown in shunt & inductance in series in this model?	10	2	2, 3	4
4b	Two loads connected in parallel are supplied from a single phase 220 V rms source. Both of the loads draw a total of 400 kW real power at 0.8 p.f. lagging. If one of the loads draws 120 kW at 0.96 pf leading, find the complex power of the second load.	10	2	2, 3	1
5	Fill in the blank (no marks without justification. Solve any 4) 1. Skin effect is due to ---- field and it is increasing ----- of the transmission line. 2. Corona effect is due to ----. 3. Lamp is a constant ---- model whereas motor is a constant --- model. 4. If the 3 phase currents are exactly equal in magnitude as well as angle, it will be considered as ----- load 5. The main reason of touch voltage & Step voltage is ----- field in the -----	20	2, 3, 4	3, 4, 5, 7	4, 5, 7
6a	The ABCD constants of a 500 kV lossless long transmission line are as follows $A = D = 0.86 + j0$, $B = 0 + j130.2$, $C = j0.002$ Find sending end voltage and current when line delivers 1000 MVA at 0.8 lagging power factor at 500kV. What will be the SIL loading of this 500kV line if its characteristic impedance is 290 ohm? Find sending end voltage and current in case of this SIL loading. Compare real and reactive power in both cases of loading. Can you see any benefit of SIL loading? What is it?	10	2	3, 4, 5	4
6b	Each one of you has been given a survey topic based on Indian/ Worldwide power scenario. Answer the following based on your topic. 1) Name of the topic 2) Important observations and technical details. (briefly) 3) Name the main or important websites/web portals on which the content of your survey is based.	10	1	1, 2	1
7a	Compare Thermal, Hydro and Nuclear power plants based on following factors- 1) Initial cost, 2) Efficiency 3) Environmental /Social Impacts Or Explain the terms Feeder, distributor & service Mains in distribution system	6	1, 4	2, 3	1
7b	Explain with phasor diagram effect of ungrounded neutral of a synchronous generator. List out the methods of grounding the neutral. Which one is mostly used for generator? Why?	10	3	3, 4	7
7c	Write short note on (any one) 1) Pumped storage hydro power plant (justify why it is to be called as storage?) 2) Sag in a transmission line & various forces involved in its calculation.	4	1, 4	2, 3	1, 6

**PREVIOUS SEM EXAMINATION JULY 2026**

Program: Electrical Engineering

Duration: 3 hour

Course Code: PC-BTE 405

Maximum Points: 100

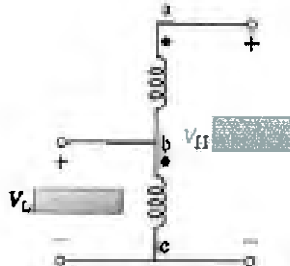
Course Name: Electrical Machines -1

Semester: IV

- Solve any 5 questions

W/T/26

Q.No.	Questions	Poi nts	CO	BL	Mod ule No.
Q1)	Which are the conditions needed to check before parallel operation	12	3	2	6
a)	of single phase and three phase transformers? And explain it.				
b).	Can transformer which is designed for 60 Hz be used for 50 Hz supply? Justify your answer.	8	3	3	7
Q2)a	Derive induced torque in DC motor (using $B \cdot i \cdot l$ concept of developed torque in one coil).	10	2	2	4
b)	Discuss the commutation in DC machine. And state the methods used for good commutation process.	10	2	2	4
Q3)a)	Explain coercive force and residual flux density terms related to hysteresis loop of ferromagnetic material.	10	1	2	1,2
b)	Discuss the vector group marking on three phase transformer with suitable example.	10	3	2	7
Q4)	The 2400:240 V, 50-kVA transformer is connected as an	12	3	3	7
a)	autotransformer, as shown in Fig. below, in which ab is the 240-V winding and bc is the 2400-V winding. (It is assumed that the 240-V winding has enough insulation to withstand higher voltage to ground.)				

	Compute the voltage ratings V_H and V_L of the high- and low-voltage sides, respectively, for this autotransformer connection. Compute the kVA rating as an autotransformer. 																		
b)	Draw field circuit connections of DC motor. (DC series, DC shunt and DC separately excited motors)	8	2	3	4														
Q5)	Fig. E1.1 represents the magnetic circuit of a primitive relay. The coil has 500 turns and the mean core path is $l_c = 360$ mm. When the air gap lengths are 1.5 mm each, a flux density of 0.8 tesla, is required to actuate the relay. The core is cast steel. a) Find the current in the coil. b) Compute the values of permeability and relative permeability of the core. c) If the air gap is zero, find the current in the coil for the same flux density (0.8 T) in the core. B-H characteristic of core material <table border="1"> <tr> <td>B (Tesla)</td> <td>0.2</td> <td>0.4</td> <td>0.6</td> <td>0.8</td> <td>1</td> <td>1.2</td> </tr> <tr> <td>H (AT/meter)</td> <td>190</td> <td>310</td> <td>400</td> <td>510</td> <td>700</td> <td>1000</td> </tr> </table>	B (Tesla)	0.2	0.4	0.6	0.8	1	1.2	H (AT/meter)	190	310	400	510	700	1000	20	1	2	3
B (Tesla)	0.2	0.4	0.6	0.8	1	1.2													
H (AT/meter)	190	310	400	510	700	1000													

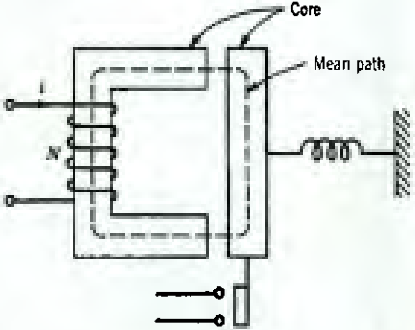


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PREVIOUS SEM EXAMINATION JULY 2026

	 FIGURE E1.1 $N = 500$ turns, $l_c = 36$ cm.				
Q6)	A 50 kVA, 2200/110 V transformer when tested gave the following results • OC test, measurements on the LV side: 400 W, 10 A, 110 V, • SC test, measurements on the HV side: 808 W, 20.5 A, 90 V Compute all the parameters of the equivalent circuit referred to the HV and LV sides of the transformer.	20	3	3	6
Q7)	A 25-kW 125-V separately-excited dc machine is operated at a constant speed of 3000 r/min with a constant field current such that the open-circuit armature voltage is 125 V. The armature resistance is 0.02 ohm. Compute the armature current, terminal power, and electromagnetic power and torque when the terminal voltage is (a) 128 V and (b) 124 V	20	2	3	4



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~~END SEMESTER EXAMINATION MAY 2026~~ / RE - EXAM JULY 2026

Program: B. Tech. (Electrical)

Course Code: PC-BTE402

Course Name: Measurement & Instrumentation

Duration: 3 hrs.

Maximum Points: 100

Semester: IV

Notes:

1. Question number 1 compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams.
4. Assume suitable data if necessary.

157126

Q. No.	Questions	Pts.	CO	BL	Mod. No.
1. (a)	With the help of neat diagram shown in Fig.1 explain in detail how to measure frequency of given signal using digital frequency meter?  Fig.1	10	3	L2	5
1. (b)	A 1000/5 A, 50 Hz current transformer has secondary burden comprising a non-inductive impedance of 2.8Ω. The primary winding has 1 turn. Calculate the net flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 2.5 W at full load. The magnetizing mmf is 150A.	10	2	L3	3
2. (a)	Explain the importance of IEC standards in electrical and electronic measurements. Discuss any two specific IEC standards relevant to measurement systems and their applications.	10	2	L1	7

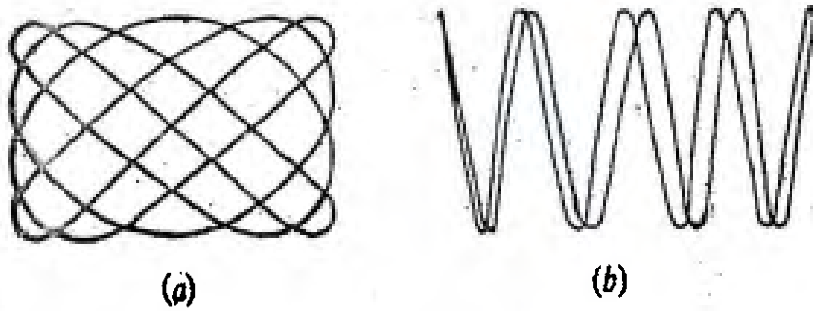
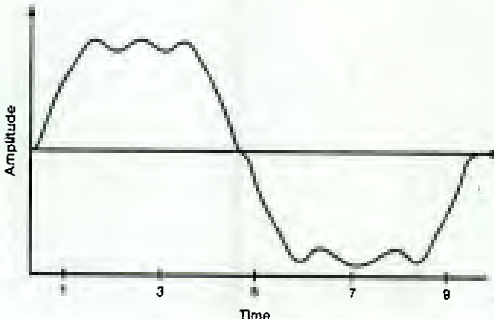
2.(b)	Draw the block diagram of a Quality Factor (Q-Factor) Meter and explain the role of each block in its operation.	10	2	L1	4
3. (a)	With the help of neat diagram explain in detail working of ramp type digital volt meter.	10	1	L1	5
3.(b)	Draw null and extreme positions of LVDT transducer to get zero, minimum and maximum output voltage.	10	1	L1	6
4. (a)	With the help of neat diagram explain in details construction and working principal of Megger.	10	1	L1	2
4. (b)	With the help of a neat diagram, explain in detail the most suitable method for the measurement of the level of distilled water, considering its poor electrical conductivity	10	2	L2	6
5.(a)	A moving coil instrument whose resistance is 25Ω gives a full-scale deflection with a voltage of 25 mV. This instrument is to be used with a series multiplier to extend its range to 10 V. Calculate multiplier resistance value?	05	2	L2	1
5.(b)	Prove that $G_f = 1 + 2\nu + \frac{\Delta\rho/\rho}{\varepsilon}$	15	2	L3	6
6. (a)	The exciting current of ring core current transformer of ratio 1000/5 A when operating at full primary current and with secondary burden of non-inductive resistance of 1.8Ω is 0.75 A at a power factor of 0.4. Calculate 1. Phase displacement between primary and secondary winding current 2. The ratio error at full load assuming that there has been no compensation.	10	1	L1	3
6.(b)	Find the frequency of the horizontal plates if the frequency applied to vertical plate is 50 Hz for the pattern shown in Fig. 2 (a) and (b). 	05	1	L2	4

Fig. 2

6.(c)	Explain in detail a five point calibration method with flow chart.	05	1	L1	7
7. (a)	With the help of a neat diagram and relevant equations, explain in detail how to measure the liquid level using the inductive method . Discuss the working principle, key components, and factors affecting the measurement accuracy.	10	2	L2	6
7. (b)	The given waveform shown in Fig. 3 contains unwanted frequency components. Explain how these components can be identified and measured.  Fig.3	10	1	L1	4



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~~End Semester Examination~~ / Re-Examination, ~~May~~ / June 2026



Max. Marks: 100

Class: S.Y.BTech (E) SEM Semester: IV

Name of the Course: Signals and Systems

Duration: 3Hr

Program: BTech Electrical

Course Code : PC-BTE405

Instructions:

- 1) Question No 1 is compulsory. Solve any four from questions 2 to 7.
- 2) In the absence of any data, make suitable assumptions and justify the same.
- 3) Answer to a question should be grouped together.

14/7/26

Q. No	Question	Max Marks	Course Outcome	Mod No.
Q1a	Determine Fourier Series of signal Calculate DC component of the signal	05	03	03
Q1b	Consider a DT system with $x[n] = \frac{1^n}{2} u[n]$ and $h[n] = \frac{1^n}{3} u[n]$. Determine output of the system. (Can use time domain OR ZT method)	05	01	02/ 05,06
Q1c	Determine initial and final value of output if $Y(z) = \frac{10z}{z^3 + 12z^2 + 39z + 28}$	05	02	06
Q1d	Determine impulse response of the system if $H(s) = \frac{(s+1)}{s^2 + 2s + 2}$ with RoC as $\text{Re}(s) < 1$	05	04	04
Q2a	Classify the system described by following input-output relation as static/dynamic, stable / unstable and linear /non-linear, causal/ non-causal and time varying / time invariant. $y(t) = x^2(t)$	10	01	01
Q2b	Plot the signals $x[n]$, $x[2n]$ and $x[n-5]$, if $x[n] = \begin{cases} 10 & n = -3, -1, 2 \\ 2 & n = 0 \\ 0 & \text{otherwise} \end{cases}$ Determine odd and even part of $x[n]$.	10	01	01

Q3a	The input- output relation of a DT system is $y[n] = 0.2 y[n-1] + 4 x[n]$. i. Determine impulse response of the system ii. Comment on the stability of the system iii. Find output when input is $x[n] = (1/4)^n u[n]$.	12	02	02
Q3b	Classify the signal $x[n]$ as periodic / aperiodic, energy / power, even / odd, causal/ non-causal where $x[n] = (-1)^n$	08	02	02
Q4a	Determine Exponential Fourier series of a full wave rectifier output if input voltage applied to the rectifier is $V_i(t) = \sin(100t)$.	12	03	03
Q4b	State and prove following properties of Fourier Transform i) Time scaling ii) Convolution	08	03	03
Q5a	Determine Laplace Transform and ROC of following signals- i) $x(t) = \delta(t) + 5 e^{-5t} u(t) + \sin(10t) u(t)$ ii) $x(t) = t^2 u(t) - e^{-2t} \sin(10t) u(t)$	10	04	04
Q5b	Consider a LTI system represented by $\frac{d^2 y}{dt^2} + 5 \frac{dy}{dt} + 6y(t) = x(t)$ Determine its impulse response and output when input applied is unit step signal.	10	04	04
Q6a	Determine impulse response and output of a system if input is $x[n] = \left(\frac{1}{3}\right)^n u[n]$. The system input output relation is given as $y[n] - 0.5 y[n-1] = x[n]$. Assume $y[-1]=2$.	10	02	05 06
Q6b	Determine Z- Transform and ROC of following signals a) $x[n] = (3^n - 4n)u[n]$ for $n \geq 0$ b) $x[n] = \left(\frac{1}{6}\right)^n u[n] + \left(\frac{1}{5}\right)^n u[-n-1]$	10	02	05 06
Q7a	Determine output of a DT system having $x[n] = \{-7, 1, -5, 4\}$ and $h[n] = \{-2, 3, -1, 6\}$ Use both time domain and Z-Transform method. Test if the system is stable.	10	02	07 06
Q7b	Realize following system in series and parallel form $H(z) = \frac{5z}{(z-10)(z+5)(z+18)}$	10	02	07



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End Semester Examination/Re-Examination – ~~May~~ June 2026

Program: S.Y.B.Tech (Electrical) *Scun IV*
Course Code: BS-BTE401
Course Name: Transforms, Statistics and Probability

Duration: 3 Hours
Maximum Points: 100
Semester: IV

Note:

1. Attempt Any Five Questions
2. Answers to the sub questions should be grouped together

13/7/26

		Questions	Points	CO	BL	Mo du le																
1	a	The probability density function of a random variable is <table><tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>P(X)</td><td>2k</td><td>4k</td><td>5k</td><td>7k</td><td>10k</td><td>15k</td><td>17k</td></tr></table> Find (i) k (ii) $P(2 \leq X \leq 5)$ (iii) $P(X \geq 3)$	X	0	1	2	3	4	5	6	P(X)	2k	4k	5k	7k	10k	15k	17k	6	CO3	BL3	3
X	0	1	2	3	4	5	6															
P(X)	2k	4k	5k	7k	10k	15k	17k															
	b	An ambulance service claims that it takes an average of 8.9 minutes to reach its destination in emergency calls. To check this claim, the agency that licenses ambulance services has them timed for 80 emergency calls, yielding a mean of 9.1 minutes with a standard deviation of 1.5 minutes. What can they conclude at the level of significance $\alpha = 0.05$?	6	CO4	BL5	6																
	c	Find Fourier series of $f(x) = \begin{cases} x & 0 \leq x \leq \pi \\ 2\pi - x, & \pi < x \leq 2\pi \end{cases}$	8	CO1	BL3	1																
2	a	A potential buyer of light bulbs bought 50 bulbs of each of 2 brands. Upon testing the bulbs, he found that brand A had a mean life of 1282 hours with a standard deviation of 80 hours, and brand B had a mean life of 1256 hours with a standard deviation of 90 hours. Can the buyer be quite certain that the mean life of the two brands differ?	6	CO4	BL5	6																
	b	A random variable X has probability density function	6	CO3	BL2	5																



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		$f(x)=\begin{cases} Cx, & 1 \leq X \leq 2 \\ Cx^2, & 2 < X < 3 \\ 0, & \text{otherwise} \end{cases}$																										
		Find the constant C and $P(X > 1.5)$																										
c		The height in cm of fathers (x) and of the sons (y) are given below <table><tr><td>X</td><td>165</td><td>160</td><td>170</td><td>163</td><td>173</td><td>158</td><td>178</td><td>170</td><td>175</td><td>180</td></tr><tr><td>Y</td><td>173</td><td>168</td><td>173</td><td>165</td><td>175</td><td>168</td><td>173</td><td>170</td><td>173</td><td>178</td></tr></table> Estimate the height of the son if the height of the father is 172 cm. Also estimate the height of the father if the height of the son is 173 cm. What is the coefficient of correlation between the height of fathers and sons?	X	165	160	170	163	173	158	178	170	175	180	Y	173	168	173	165	175	168	173	170	173	178	8	CO3	BL3	3
X	165	160	170	163	173	158	178	170	175	180																		
Y	173	168	173	165	175	168	173	170	173	178																		
3	a	Find Fourier Cosine Transform of $f(x)=\begin{cases} \cos x, & 0 \leq x \leq a \\ 0, & x > a \end{cases}$	6	CO2	BL4	2																						
	b	A sample of 25 pairs of values x and y gave the following results: $\sum x=127$, $\sum y=100$, $\sum x^2=760$, $\sum y^2=449$, $\sum xy=500$. Later, it was found that two pairs of values were taken as (8,14) and (8,6) instead of the correct values (8,12) and (6,8). Find correct correlation coefficient between x and y.	6	CO3	BL5	3																						
	c	Find Mean and Variance of Poisson Distribution	8	CO3	BL5	4																						
4	a	Compute spearman's rank correlation coefficient for the following data <table><tr><td>X</td><td>36</td><td>56</td><td>20</td><td>42</td><td>33</td><td>44</td><td>50</td><td>15</td><td>60</td></tr><tr><td>Y</td><td>50</td><td>35</td><td>70</td><td>58</td><td>75</td><td>60</td><td>45</td><td>80</td><td>38</td></tr></table>	X	36	56	20	42	33	44	50	15	60	Y	50	35	70	58	75	60	45	80	38	6	CO3	BL5	3		
X	36	56	20	42	33	44	50	15	60																			
Y	50	35	70	58	75	60	45	80	38																			



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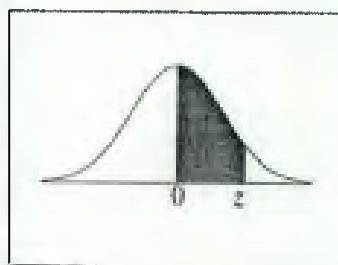
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	b	During war, 1 ship out of 7 was sunk on average during a certain voyage. What is the probability that out of a convoy of 6 ships (i) exactly 3 will arrive safely, (ii) at least 3 will arrive safely?	6	CO3	BL3	4																		
	c	Express the function $f(x)=\begin{cases} 1, & x <1 \\ 0, & x >1 \end{cases}$ as a Fourier Integral. Hence evaluate (i) $\int_0^{\infty}\left[\frac{\sin \lambda \cdot \cos \lambda x}{\lambda}\right] d \lambda$ (ii) $\int_0^{\infty} \frac{\sin \lambda \cdot \cos \lambda}{\lambda} d \lambda$	8	CO2	BL3	2																		
5	a	Find Half Range Fourier Sine series of $f(x)=\pi x-x^2, \quad 0 \leq x \leq \pi$	6	CO1	BL4,5	1																		
	b	Two random sample gave the following data <table><tr><th>Sample No</th><th>Size</th><th>Mean</th><th>Variance</th></tr><tr><td>1</td><td>1000</td><td>67.42</td><td>2.58</td></tr><tr><td>2</td><td>1200</td><td>67.25</td><td>2.5</td></tr></table> Is the difference between standard deviation significant?	Sample No	Size	Mean	Variance	1	1000	67.42	2.58	2	1200	67.25	2.5	6	CO4	BL4	6						
Sample No	Size	Mean	Variance																					
1	1000	67.42	2.58																					
2	1200	67.25	2.5																					
	c	Two independent samples of sizes 8 and 7 contained the following values <table><tr><td>Sample I</td><td>19</td><td>17</td><td>15</td><td>21</td><td>16</td><td>18</td><td>16</td><td>14</td></tr><tr><td>Sample II</td><td>15</td><td>14</td><td>15</td><td>19</td><td>15</td><td>18</td><td>16</td><td></td></tr></table> Is the difference between the sample means significant?	Sample I	19	17	15	21	16	18	16	14	Sample II	15	14	15	19	15	18	16		8	CO4	BL2, BL4	7
Sample I	19	17	15	21	16	18	16	14																
Sample II	15	14	15	19	15	18	16																	
6	a	Obtain complex form of Fourier Series for the function $f(x)=\cosh 3 x+\sinh 3 x, \quad x \in[-\pi, \pi]$	6	CO1	BL5	1																		

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	b	Test results for the breaking strength of 10 pieces of metal were: 578, 572, 570, 568, 572, 570, 570, 572, 596, and 584 kg. Test whether the mean breaking load of the metal wire can be assumed to be 577 kg at 5% LOS.	6	CO4	BL3	7												
	c	For normal distribution 30% items are below 45 and 8% items are above 64. Find the mean and variance of the normal distribution	8	CO3	BL3, BL5	5												
7	a	Fit a binomial distribution to the following data <table border="1"><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>f</td><td>12</td><td>66</td><td>109</td><td>59</td><td>10</td></tr></table>	x	0	1	2	3	4	f	12	66	109	59	10	6	CO3	BL2, BL3	4
x	0	1	2	3	4													
f	12	66	109	59	10													
	b	The weights of 5000 students are found to be normally distributed with mean 50 kilograms and standard deviation 5 kg. Find the number of students with weights (i) less than 45 kg. (ii) Between 45 and 60 kg.	6	CO3	BL5	5												
	c	Find Fourier series of $f(x) = x + x^2 \quad x \in [-\pi, \pi]$	8	CO1	BL1, BL3	1												

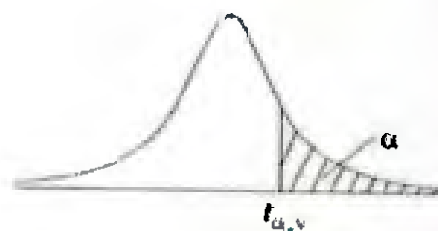
Standard Normal Distribution Table



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

Table of the Student's *t*-distribution

The table gives the values of $t_{\alpha, v}$ where
 $\Pr(T > t_{\alpha, v}) = \alpha$, with v degrees of freedom



$\alpha \backslash v$	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
1	3.078	6.314	12.076	31.821	63.657	318.310	636.620
2	1.886	2.920	4.303	6.965	9.925	22.326	31.598
3	1.638	2.353	3.182	4.541	5.841	10.213	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	1.319	1.714	2.069	2.500	2.807	3.485	3.767
24	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	1.296	1.671	2.000	2.390	2.660	3.232	3.460
120	1.289	1.658	1.980	2.358	2.617	3.160	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.090	3.291