Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER EXAMINATION - JULY 2023

14/7/23

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

Course Code: BS-BTE401

Course Name: Applied Mathematics-IV

Duration: 3 Hours

Maximum Points: 100

Semester: IV

Note:

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

		Questions	Points	CO	BL	Module
1	a	The probability of a man hitting the target at a shooting range is $\frac{1}{4}$. If he shoots 10 times, what is the probability that he hits the target exactly three times? What is the probability that he hits the target at least once?	6	CO2	BL5	
	b	The equations of the lines of regression are $20x-9y-107=0$ and $4x-5y+33=0$ Find $\bar{x}, \bar{y}$ and r.	6		BL5	
	c	Solve the following system of equations using Gauss Seidel Iterative method $6x+15y+2z=72$ $x+y+54z=110$ $27x+6y-z=85$	8		BL3	
2	a	A manufacturer of electric bulbs, according to certain process, finds the S.D. of the life of lamps to be 100 hours. He wants to change the process, if the new process results in a smaller variation in the life of lamps. In adopting a new process, a sample of 150 bulbs gave S.D of 95 hours. Is the manufacturer justified in changing the process?	6		BL5	
	b	Find real root of the equation $x^3-3x+1=0$ lying between 1 and 2 correct to three decimal places using Newton-Raphson method.	6		BL2	
	c	Two independent samples of sizes 8 and 7 contained the following	8		BL3	

END SEMESTER EXAMINATION - JULY 2023

values

Sample I	19	17	15	21	16	18	16	14
Sample II	15	14	15	19	15	18	16	

Is the difference between the sample means significant?

3	a	The mean number of bacteria per milliliter of a liquid is known to be 6. Find the probability that in 1 milliliter of the liquid, there will be: (i) 0, (ii) 1, (iii) 2, (iv) 3, (v) less than 4, (vi) 6 bacteria.	6		BL4	
	b	Using Taylor's series method, find $y(1.1)$ and $y(1.2)$ by solving the differential equation $\frac{dy}{dx}=x^2+y^2;\quad y(1)=2$	6		BL5	
	c	In the usual notation, prove the Spearman's formula for Rank correlation $R=1-\frac{6}{n(n^2-1)}\sum_{i=1}^{n}d_i^2$, where $d_i=x_i-y_i$	8		BL5	
4	a	From the following data, compute the rank correlation.	6		BL5	

X	82	68	75	61	68	73	85	68
Y	81	71	71	68	62	69	80	70

	b	The marks obtained by students in a certain examination follow a normal distribution with mean 55 and standard deviation 10. If 500 students appeared at an examination, calculate the number of students scoring (i) less than 50 marks (ii) more than 65 marks.	6		BL3	
	c	Given $\frac{dy}{dx}=1+xy;\ y(0)=2$. Find $y(0.1)$ and $y(0.2)$ using fourth order Runge-Kutta method	8		BL3	
5	a	Find constant k such that the function	6		BL4,5	

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		$f(x)=\begin{cases} k(1-x^2), & \text{if } 0\le x\le 1 \\ 0 & \text{elsewhere} \end{cases}$ is the probability density function. Also find $P(0.1\le X\le 0.2)$ and $P(X\ge 0.5)$				
	b	The S.D of a random sample 0f 1000 is found to be with 2.6 and the S.D of another random sample of 500 is 2.7. Assuming the samples to be independent, find whether the two samples could have come from population with the same S.D?	6		BL4	
	c	Solve the following system of equations using Gauss Jacobi Iterative method $28x+4y-z=32$ $x+3y+10z=24$ $2x+17y+4z=35$	8		BL2, BL4	
6	a	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		BL5	
	b	The coefficient of rank correlation between marks in two subjects obtained by a group of students is 0.8. If the sum of squares of the differences in ranks is 33. Find the number of students in the group.	6		BL3	
	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		BL3, BL5	
7	a	Two random sample gave the following data Is the difference between standard deviation significant?	6		BL2, BL3	

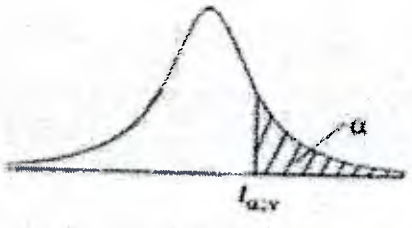
Sample No	Size	Mean	Variance
1	1000	67.42	2.58
2	1200	67.25	2.5

Chi-Square (χ^2) Distribution

Degrees of Freedom	Area to the Right of Critical Value									
	0.995	0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01	0.005
1	—	—	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.071	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.299
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.042	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	36.741	40.113	43.194	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993
29	13.121	14.257	16.047	17.708	19.768	39.087	42.557	45.722	49.588	52.336
30	13.787	14.954	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	55.329	85.527	90.531	95.023	100.425	104.215
80	51.172	53.540	57.153	60.391	64.278	96.578	101.879	106.629	112.329	116.321
90	59.196	61.754	65.647	69.126	73.291	107.565	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169

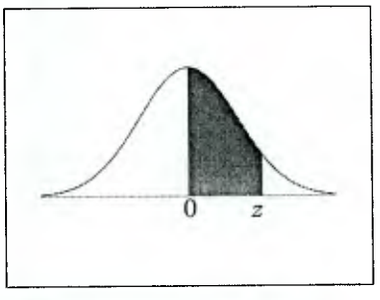
Table of the Student's *t*-distribution

The table gives the values of $t_{\alpha;\nu}$ where
$\Pr(T_\nu > t_{\alpha;\nu}) = \alpha$, with ν degrees of freedom



ν \ α	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

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

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Bharatiya Vidya Bhavan's
Sardar Patel College of Engineering
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058

End Sem July 2023

17/7/23

Program: Electrical Engineering
Course code: PC-BTE401
Name of the Course: Analog Circuits

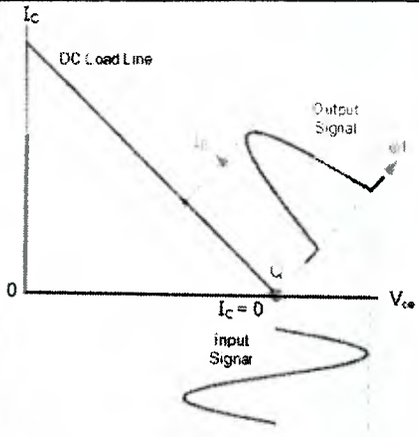
Duration: 3 Hour
Maximum Marks: 100
Semester: IV

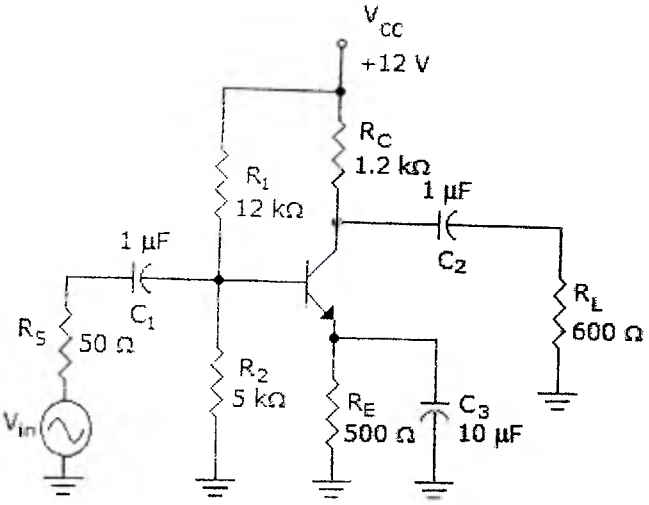
S.Y. B.Tech Sem (IV) Elect.

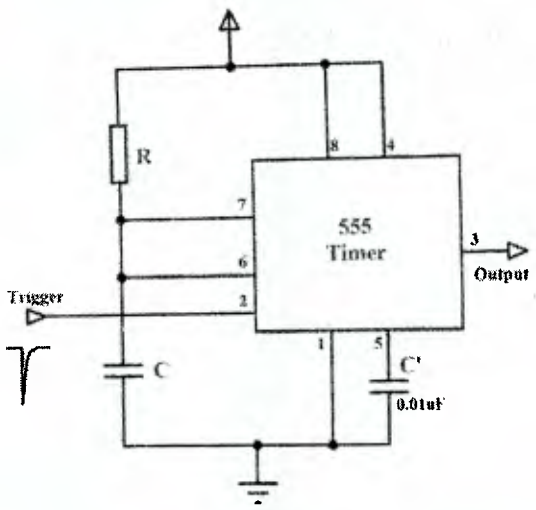
Solve any five questions out of seven.

Q. No.		Pts	CO	BL	Module
1 A	Match the following two columns . Explain the same.	10	1	2	1

Column A	Column B
Collector current in quiescent condition is zero	Transformer coupled class A amplifier
theoretical conversion efficiency of 50%	Class B amplifier
To overcome Cross over distortion	Class C amplifier
theoretical conversion efficiency of 25%	Class AB amplifier
operating point is placed below the cut-off point on the DC load-line	Series fed class A amplifier.

B	Given below is the output characteristic curve of power amplifier showing I/O signals with respect to load line. Identify the class. Hence draw the circuit diagram. Explain the same with the help of input and output waveforms. Is output faithful reproduction of the input? If yes explain under which condition? .	10	1	1	1
					
2 (i)	Determine the frequency of oscillation for the astable multivibrator using IC-555. Given that $R_A = R_B = 2.5K\Omega$ and C = 1500 pF.	2	1	2	1
(ii)	State the Barkhausens criteria	2	5	1	7
(iii)	Explain the term order with respect to the filter.	2	2	3	3
(iv)	Linear regulators are more efficient than switching regulators. T/F. Justify	3	3	5	4
(v)	Values of BW and gain of an amplifier without feedback are is 1000Hz and 10^3 respectively. Determine BW for feedback factor of -0.05.	2	4	3	6

(vi)	A certain amplifier has a bandwidth of 22.5 kHz with a lower cutoff frequency of 800 Hz. What is the value of upper cut off frequency?	2	4	3	2
(vii)	If DC power for a Class A power amplifier is 550W and AC power is 250W, what is its efficiency?	2	5	3	5
(viii)	Which type of power amplifier is biased for operation less than 180° of the cycle? State the application.	2	1	1	1
(ix)	What do you mean by pass band with respect to active filter? Explain with frequency response.	3	5	2	5
3 A	Determine higher cutoff frequency for the circuit shown below. Given C_{be} = 36pF, C_{bc} = 4 pF, C_{ce} = 1 pF, C_{wi} = 6 pF, C_{wo} = 8 pF, h_{fe} = 100, h_{ie} = 1 KΩ	10	4	3	2
					
B	State true/ False. Justify.	10	4	5	2
(i)	Opamp is suitable for amplification of DC signals				
(ii)	Gain of BJT reduces at high frequency.				
4 A (i)	Voltage gain of an amplifier without feedback is 80dB. It decreases to 40dB with feedback. Determine the value of feedback factor.	3	4	3	6
(ii)	The distortion in an amplifier with feedback is found to be 3%. The feedback factor is 0.04. When the feedback is removed, the distortion becomes 15%. Find the open and closed loop gain.	3	4	3	6
(iii)	With a negative voltage feedback, an amplifier gives an output of 10 V with an input of 0.5 V. When feedback is removed, it requires 0.25 V input for the same output. Calculate (i) gain with feedback (ii) gain without feedback (iii) feedback fraction.	4	4	3	6
B	State whether following statements are true or false. Justify your answer.	10	4	5	6
(i)	Input impedance increases in case of current series feedback				
(ii)	Negative feedback is employed in the amplifiers in spite of reduction in gain				
5 A (i)	Voltage regulator has to provide 6V at 10 A. Draw the suitable circuit diagram using 723 specifying component values .	5	3	1	4

(ii)	Explain use of 7805 to provide 8.5 V.	5	3	2	4
B	What is current limit protection ? what is the arrangement for the same in IC 723? Explian constant current limiting .	10	3	1	4
6 A	With suitable waveforms explain pulse width modulation using 555.	10	2	1	3
B (i)	Identify the application of IC 555 in the following diagram. Hence draw the output waveform showing the timing details. Given Vcc = 12 V, trigger pulse variation is from 0 to - 5 V, R = 1 kΩ, C = 1μF	4	2	3	3
					
(ii)	Calculate component values needed for first order Butterworth LPF at cutoff frequency 3 kHz and pass band gain of 3. Draw circuit diagram. Calculate Bandwidth.	6	5	3	5
7A	With a neat circuit diagram, Explain RC phase shift oscillator using BJT	10	5	2	7
B	Explain working principal of crystal oscillator	5	5	1	7
	Draw the circuit of wien bridge oscillator by selecting proper components values to get oscillator frequency of 1.2kHz.	5	5	3	7

BharatiyaVidyaBhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

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Munshi Nagar, Andheri (W) Mumbai – 400058

End Sem. Examination - July 2023

19/7/23

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

Course Code: PC-BTE402

Course Name: Electrical and electronic measurement

Duration: 3 hrs.

Maximum Points: 100

Semester: IV

Notes: S.Y. B Tech (Sem IV)

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

Q. No.	Questions	Pts.	CO	BL	Mod. No.
1. (a)	An inductance of 0.22 H and 20 Ω resistance is measured by comparison with a fixed standard inductance of 0.1 H and 40 Ω resistance. They are connected as shown in Fig.1. The unknown inductance is in arm **ab** and the standard inductance is arm **bc**, a resistance of 750 Ω is connected in arm **cd** and a resistance whose amount is not known is in arm **da**. Find the resistance of arm **da** and show any necessary and practical addition required to achieve both resistive and inductive balance.	10	2	L3	2

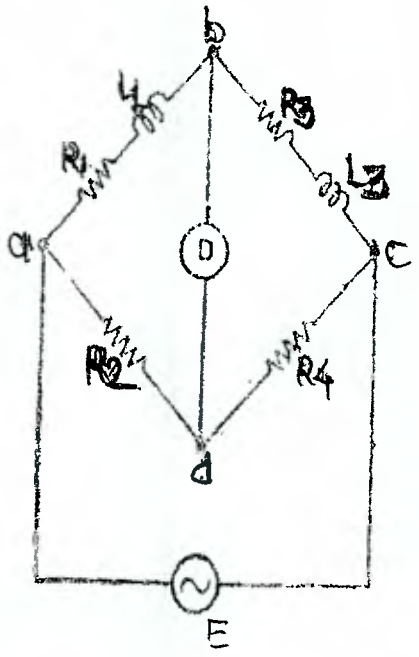
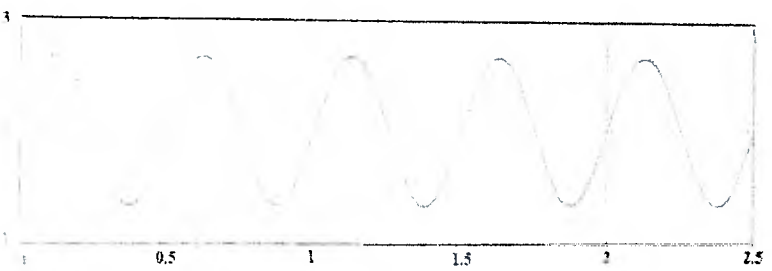
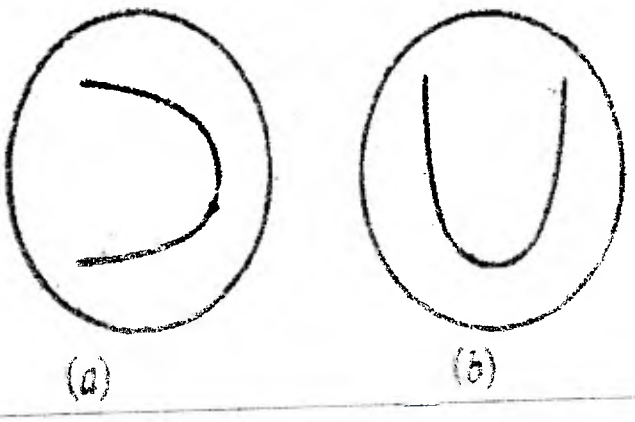


Fig. 1

(b)	With the help of neat diagram explain in detail working of duel slope integrating type digital volt meter. What are the advantages of a duel slope integrating DVM over Ramp type DVM.	**10**	**1**	**L1**	**5**
2. (a)	A Lissajous pattern on the oscilloscope is stationary and has 6 vertical maximum values and five horizontal maximum values. The frequency of horizontal input is 1500 Hz. Determine the frequency of vertical input.	**05**	**1**	**L1**	**4**
(b)	Prove that $$G_f = 1 + 2\nu + \frac{\Delta\rho/\rho}{\varepsilon}$$	**15**	**2**	**L3**	**6**
3. (a)	Draw null and extreme positions of LVDT transducer to get zero, minimum and maximum output voltage.	**10**	**1**	**L1**	**6**
(b)	With the help of neat diagram explain in detail how to measure frequency of given signal using digital frequency meter?  **Time in second**	**10**	**3**	**L2**	**5**
4. (a)	Draw and explain the nature of equivalent circuit and corresponding phasor diagram of a current transformer. Derive expressions for the corresponding ratio error and phase angle error.	**15**	**1**	**L1**	**3**
(b)	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). 	**05**	**1**	**L2**	**4**

5. (a)	With the help of neat diagram explain in details construction and working principal of Megger.	**10**	**1**	**L1**	**2**
(b)	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**
(c)	Explain in detail a five point calibration method with flow chart.	**05**	**1**	**L1**	**7**
6.	With the help of neat diagram explain in details how to measure water level by using following methods. a. Resistive method b. Inductive method c. Capacitive method	**20**	**2**	**L2**	**6**
7. (a)	With the help of neat diagram explain in detail how to measure time interval between two events digitally?	**10**	**1**	**L1**	**5**
(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**
(c)	Explain the term 1. Sampling and holding 2. Quantizing and encoding	**05**	**1**	**L1**	**5**

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

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

END SEMESTER EXAMINATION JULY 2023

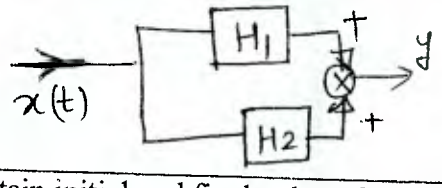
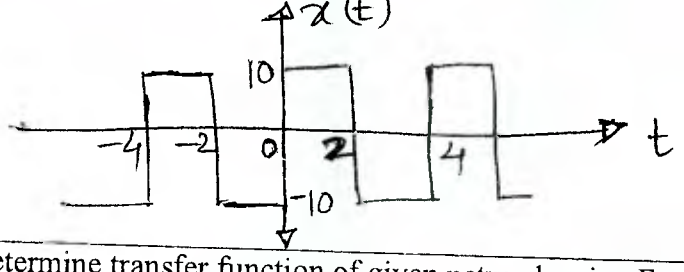
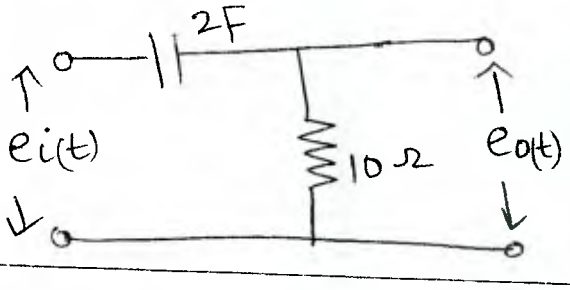
21/7/23

Program: SYBTech(E)
Course Code: PC-BTE403
Course Name: Singals and Systems

Duration: 3 Hr
Maximum Points:100
Semester: IV

Note: a) Q1 is compulsory.
b) Solve any four from remaining questions.
c) Assume suitable data if required.

S.Y. B.Tech (ETRX) Sem IV

Q.No.	Questions	Pts	CO	BL	Mod No.
Q1a	Test if the system $y[n] = x[-n]$ is stable, static and time varying.	05	01	03	01
Q1b	Determine Laplace Transform and region of convergence of a signal $x(t) = e^{-2t}u(t) + e^{2t}u(-t) + e^{-3t}u(t) + e^{3t}u(-t)$	05	04	03	04
Q1c	Calculate the output of a system shown below-  $x = \{1, \underset{\uparrow}{0}, 1\}$ $h_1 = \{2, \underset{\uparrow}{3}\}$ $h_2 = \{4, \underset{\uparrow}{5}, -1\}$	05	02	03	02, 07
Q1d	Obtain initial and final value of a signal x[n] if $X(z) = \frac{z+2}{(z+1)(z-1)(z+10)}$.	05	05	03	06
Q2a	Consider a periodic signal x(t). What will be the magnitude and phase angle of DC, 3rd and 8th harmonic component? 	10	03	03	03
Q2b	Determine transfer function of given network using Fourier transform and plot the frequency response of the system.  $e_i \rightarrow$ input $e_o \rightarrow$ output	10	04	03	03

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END SEMESTER EXAMINATION JULY 2023

Q3a)	Realize a DT system in Direct I and Direct II form if system transfer function is $H(z) = \frac{(z+2)(z+3)}{(z+1)(z+4)(z+5)}$	10	05	03	07
Q3b)	Obtain series and parallel realization of a system having transfer function $H(s) = \frac{4(s+1)}{(s+2)(s+5)}$.	10	05	03	07
Q4a)	Plot signal x(t+3) and x(-2t+3) if $x(t) = \begin{cases} 1-t, & 0 \le t \le 1 \\ 0, & otherwise \end{cases}$	05	01	03	01
Q4b)	Test if the signal $x[n] = (-1)^n$ is causal, periodic, power signal. Justify the same.	05	01	03	01
Q4c)	Determine output of the system using graphical method if $x[n] = (\frac{1}{2})^n u[n]$ and $h[n] = \delta[n] - \frac{1}{2}\delta[n-1]$. Comment on the stability of the system and classify it as FIR /IIR system.	10	02	03	02
Q5a)	State and prove convolution property of Z-Transform	05	05	02	05
Q5b)	Determine impulse response and output of the system described as $2\frac{dy}{dt} - 7y = 10x(t)$ where $x(t) = e^{-2t}u(t)$. Comment on the stability of the system	05	04	03	04
Q5c)	The unit step response of a second order underdamped system starting from rest is given by $c(t) = 12.5\, e^{-6t} \sin(8t)\ u(t)$. Calculate steady state value of the unit step response of the system. Draw pole zero plot of the system and comment on the stability.	10	04	03	04
Q6a)	Determine Z- Transform of y[n] = x1[n] * x2[n] where $x_1[n] = \{2, \underset{\uparrow}{5}, -6, 7\}, x_2[n] = \{\underset{\uparrow}{4}, 2, 3\}$	05	05	03	05
Q6b)	Determine inverse Z-Transform of $X(z) = \frac{4}{z+5}$ if |z|<5. Use long division method.	05	05	03	05
Q6c)	Determine inverse Z-Transform of $X(z) = \frac{2z-4}{3z^2-4z+1}$ if |z|<1/3	10	05	03	05
Q7a)	For a LTI system described by $y[n] - 5y[n-1] + 6y[n-2] = x[n]$, where x is input and y is output of the system, determine output of the system if $x[n] = u[n]$, $y[-1] = 3$, $y[-2] = 2$. Determine output of the system using time domain analysis.	10	02	03	02
Q7b)	Obtain zero state and zero input response of system described in Q7a). (Use Z-transform)	10	05	03	06

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

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Munshi Nagar, Andheri (West), Mumbai – 400058

End Sem July 2023

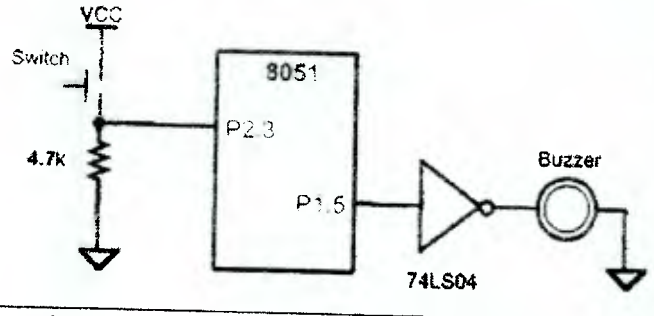
24/7/23

Program: Electrical Engineering
Course code: PC-BTE404
Name of the Course: Microprocessor and Microcontroller

Duration: 3 Hours
Max. Marks: 100
Sem. IV

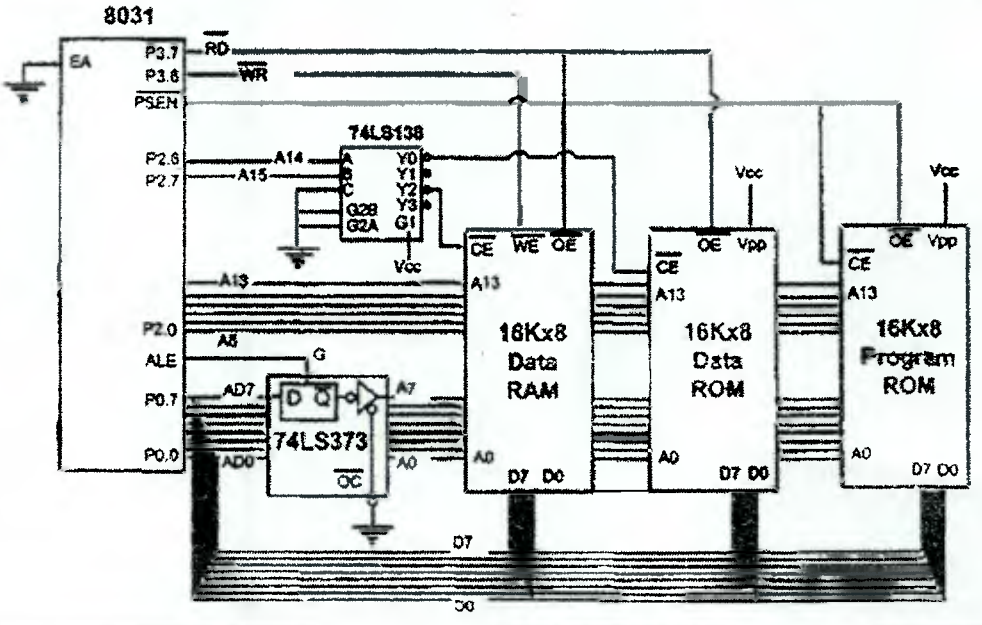
S.Y.B.Tech (Elect. Engg.) (Sem IV).

- **Solve any five questions out of seven.**
- **Answers to all sub questions should be grouped together.**
- **Make suitable assumptions whenever necessary. State them clearly.**
- **Diagrams drawn to support your answer should be clearly visible.**

Q. No.		Pts	CO	BL	Module
1A	List any 5 applications where μC is used. Explain the roll of μC (min 5 points) in any one of the applications.	10	3	1	1
B (i)	Toggle bit P1.2 continuously. (a) using CPL instruction (b) without using CPL instruction	2	1	3	4
(ii)	Write a program to save accumulator in R7 of bank 2	2	1	3	2
(iii)	Assume that bit P2.3 is an input and represents the condition of an oven. If it goes high, it means that the oven is hot. Monitor the bit continuously. Whenever it goes high, send a high-to-low pulse to port P1.5 to turn on a buzzer. 	2	1	3	3
(iv)	Port lines P0.0 to P0.3 are used to take in 4 bits data from i/p device. This data is to be displayed on 4 LEDs connected to port pins P1.4 to P1.7 of port 1. Write a program to do this using SWAP.	2	1	3	2
(v)	Determine A after execution of the following. **MOV A, #48H** **XRL A, #24H**	2	1	3	4
2	Match the following two columns. Explain the same.	20	1	2	5

Column A	Column B
PSEN	Data RAM
RD	Lower order Address and data bits AD0 –AD7
Port P0	Program ROM
RD, WR	Data ROM
Port P2	Higher order Address bits A8-A15

3A (i)	Find (a) the frequency of the square wave generated in the following code (b) the duty cycle of this wave. Given clock frequency 11.0592MHz **MOV TMOD, #2H** **MOV TH0, -150** **AGAIN : SETB P1.3** **ACALL DELAY** **ACALL DELAY** **CLR P1.3** **ACALL DELAY** **SJMP AGAIN** **DELAY: SETB TR0** **BACK: JNB TF0, BACK** **CLR TR0** **CLR TR0** **RET**	5	2	-3	5
(ii)	The word "SYBTech" is stored in ROM space starting from 250H. Write a program to transfer these bytes into RAM locations starting from 40H.	5	1	3	3
B (i)	Draw the interfacing diagram with LCD and 8051, in which Port 1 is used to connect data bus of 8051. P 2.0, P 2.1 and P2.2 are to be connected to RS, R/$\overline{W}$, E respectively. Write a subroutine for writing command to LCD.	6	2	3	7
(ii)	Explain difference between RET ands RETI	4	1	1	5
4A	With the help of neat timing diagram explain the role of following pins of ADC 0804. (i) CS (ii) WR (iii) D0-D7 (iv) INTR (v) RD	10	2	2	5
B	Explain the connection between 8051 and DAC0808 with the help of a neat interfacing diagram. Write a program to generate triangular waveform.	10	21	3	5
5A	Write a program that continuously gets 8-bit data from P0 and sends it to P1 while simultaneously creating a square wave having period of 200 μS. (on pin P2.1). Use Timer 0 in mode 2 to create the square wave. Assume that XTAL =11.0592 MHz. Explain the use of interrupt in detail.	10	2	3	5
B (i)	Explain what is represented by the following part of the code. Specify its significance with the help of suitable diagrams. **PUSH 05** **PUSH 06** **PUSH 0F0H** **POP 0E0H** **POP 02** **POP 03**	06	1	1	2
(ii)	Draw the diagram showing the PSW register. Hence write proper instructions to select bank 3.	4	1	2	2
6A	4x 4 matrix keyboard is to be interfaced with 8051 connecting D0 to D3 of port 1 as rows and D0 to D3 of port 2 as columns. Draw the diagram showing the connection. Explain the method to confirm valid key press.	10	2	2	7
B (i)	With the help of a neat diagram showing TCON and IE, explain the following code lines. **MAIN : SETB TCON.2** **MOV IE , #10000100B** **HERE: SJMP HERE** **END**	4	1	1	4

(ii)	A letter 'Y' is to be transferred serially at a baud rate of 4800. Crystal frequency is11.0592MHz. Explain initialization required i.e. value to be stored in SCON, TMOD, TH1. Explain with suitable diagrams.	6	2	3	6
7A (i)	Assuming that XTAL = 11.0592 MHz for the following program, (a) explain what this program does (b) find the baud rate of the data transfer.	6	2	3	6
	MOV A, PCON **SETB ACC.7** **MOV PCON, A** **MOV TMOD, #20H** **MOV TH1, -3** **MOV SCON, #50H** **SETB TR1** **MOV A, # "B"** **A_1: CLR TI** **MOV SBUF, A** **H_1: JNB TI H_1** **SJMP A_1**				
(ii)	Assuming crystal frequency of 12 MHz, calculate the delay associated with HERE loop. It is given that machine cycles required for NOP is 1 and for DJNZ is 2. **DELAY : MOV R4 , #250** **HERE: NOP** **NOP** **NOP** **NOP** **NOP** **DJNZ R4, HERE** **RET**	2	1	3	4
(iii)	A switch is connected to pin P1.7 and LED to Pin 2.0. Write a program to get status of the switch and send it to the LED using BIT directive.	2	1	3	4
B	Refer to the diagram. Determine the address space of data RAM and data ROM and explain function of pins ALE, EA.	10	3	3	5
					

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ENDSEM EXAMINATION JULY 2023

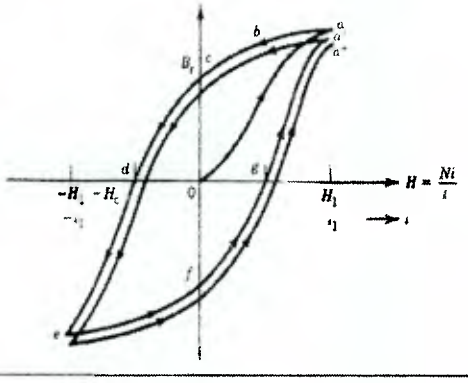
Program: Electrical Engineering **Duration: 3 hour** 26/7/23

Course Code: PC-BTE 405 **Maximum Points: 100**

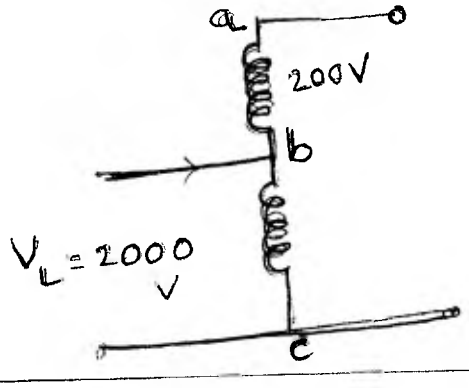
Course Name: Electrical Machines -1 **Semester: IV**

S.Y. B.Tech (Sem IV) (Elect)

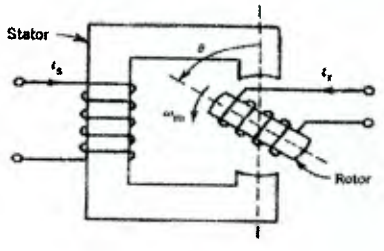
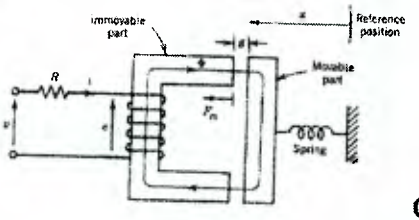
- **Question 1 is compulsory**
- **Solve any 4 questions from remaining 6 questions**

Q.No.	Questions	Points	CO	BL	Module No.
1. a)	In B-H curve shown below identify 1. coercive force 2. residual flux density 	2	1	2	1,2
b)	Write the voltage equation of DC shunt motor and generator.	4	2	2	4
c).	On three phase transformer specification if '**Dyn11**' is mentioned then discuss what every word describes.	5	3	2	7
d)	In 8 pole machine 90 degree electrical rotation is equal to how many mechanical degrees?	3	2	3	5
e)	Draw and explain torque speed characteristics of DC shunt and series motor.	6	2	2	5
Q2)	Tests are performed on a 1φ, 20 kVA, 2200/220 V, 50 Hz transformer and the following results are obtained.	20	3	3	6

	Open-Circuit Test (high-voltage side open)	Short-Circuit Test (low-voltage side shorted
Voltmeter	220 V	150 V
Ammeter	2.5 A	4.55 A
wattmeter	100 W	215 W

	Derive the parameters for the approximate equivalent circuits referred to the low-voltage side (marks 5) and the high-voltage side (marks 5). (b) Express the excitation current as a percentage of the rated current (marks 4). (c) Determine the power factor for the no-load (marks 3) and short-circuit tests (marks 3).				
Q3) a)	Which are the conditions needed to check before parallel operation of single phase transformers? If that conditions are not satisfied then what will happen?	12	3	2	6
b)	Can transformer which is designed for 60 Hz be used for 50 Hz supply? Justify your answer.	8	3	3	7
Q4)a)	A four-pole dc machine has an armature of radius 12.5 cm and an effective length of 25 cm. The poles cover 75% of the armature periphery. The armature winding consists of 33 coils, each coil having seven turns. The coils are accommodated in 33 slots. The average flux density under each pole is 0.75T. If the armature is lap-wound, (a) Determine the armature constant Ka. (b) Determine the induced armature voltage when the armature rotates at 1000 rpm. (c) Determine the current in the coil and the electromagnetic torque developed when the armature current is 400 A. (d) Determine the power developed by the armature. If the armature is wave-wound, repeat parts (a) and (b) above The current rating of the coils remains the same as in the lap-wound armature	14	2	3	5
b)	A 1φ, 100 kVA, 2000/200 V two-winding transformer is connected as an autotransformer as shown in Fig below such that more than 2000 V is obtained at the secondary. The portion ab is the 200 V winding, and the portion bc is the 2000 V winding. Compute the kVA rating as an autotransformer. 	6	3	3	6
Q5) a)	A 4- pole, 240 V, wave connected shunt motor gives 11.19 kW when running at 1000 rpm and drawing armature and field currents of 50 A and 1 A resp. It has 540 conductors. Its resistance is 0.1 ohm. Assuming a drop of 1 V per brush, find Total torque, useful torque, useful flux per pole, rotational losses and	18	2	3	5

ENDSEM EXAMINATION JULY 2023

	efficiency				
b)	Lap winding is used for high current and low voltage ratings. Justify.	2	2	2	4
Q6)	Derive the torque developed in a rotational electromagnetic system shown in given figure. i_s and i_r are stator and rotor currents. 	20	1	2	3
Q7)	 Consider the system show above. Let the movable part move from one position (say x = x1) to another position (x = x2) so that at the end of the movement the air gap decreases. Derive the mechanical force developed for following conditions a) the movable part has moved slowly b) the movable part has moved quickly	20	1	2	3

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End Semester Exam

July 2023

Max. Marks: 100 28/7/23 **Duration: 3 Hrs**

Class: S.Y B. Tech **Semester: IV**

Name of the Course: Indian Traditional Knowledge **Program: Civil/Elect**

Course Code: MC 002

Instructions: S.Y. B.Tech (Civil/ETRX) July IV

- **Draw neat sketches/diagrams wherever required**
- Figure on right indicate **maximum points** for the given question, **course outcomes attained and Bloom's Level**
- **All the best**

		Marks	CO	BL
Q1	**Answer the following questions:**	**(20)**	**1-2**	**1-3**
(a)	Explain the concept of traditional knowledge and it's importance. Explain it's components.	**(10)**		
(b)	Write a note on traditional water harvesting systems used and in use today.	**(05)**		
(c)	a Austro Asiatic — i Munda, Khasi b Indo Aryan — ii Devnagari c Dravidian — iii Assamese d Tibetan Burman — iv Hindi e Khariboli — v Tamil	**(05)**		
Q2	**Answer the following questions:**			
(a)	Match the following	**(20)**		
	a Bhaskaracharya — i Connection of Physical Well being and mental health b Kanad — ii Motion of planets c Bhardwaj — iii "Anu" (unbreakable particle) d Aryabhatta — iv Lilavati and Bijganit e Charak — v Vimana Shastra	**(05)**	3	**1-2**
(b)	Explain similarities of typical inventions and discoveries supposed to made by specific sages with western discoveries and inventions.	**(10)**	2-3	**2**
(c)	Explain the context of Mahabharata in regards to nuclear weapons. Also what is the importance of 30 th chapter of Shrimad Bhagwatam.	**(05)**	3-4	**2**
Q3	**Answer the following questions:**	**(20)**	1-3	**4**
(a)	Explain the importance of any 3 local medicinal plants in Ayurveda and diseases cured by them.	**(10)**		
(b)	Write a note on vernacular architecture. Explain the elements of vernacular architecture in any building or structure observed by you in India	**(10)**		

Q4	**Answer the following questions:**			
(a)	Explain all 4"Vedas" in detail. What are the sections of Vedas.	**(10)**	**2-3**	**2**
(b)	**Fill in the blanks**	**(05)**		
	i. Sam Veda is chanted by _____ priests.			
	ii. The term_____ means those who sit near.			
	iii. The hymns of _____ are dedicated to five elements of nature			
	iv. The _____ is second section of Vedas which try to explain the importance of hymns in Samhitas			
	v. _____ means liberation from the cycle of birth and death according to Rig Veda			
(c)	Match the following	**(05)**		

a	Ayurveda	i	Yajurveda
b	Nirukta	ii	Sam Veda
c	Gandharvaveda	iii	Upanga
d	Dhanurveda	iv	Rig Veda
e	Yoga	v	Vedanga

Q5	Answer the following questions	**(20)**	3-4	
(a)	Explain in details the following classical dances with respect to region, description, dress/makeup ,unique features, instruments accompanied (a) Bharatnatyam (b) Kathak (c) Kathakali (d) Kuchipudi	**(10)**		
(b)	Give names of any 10 states with specific folk dance related to it	**(05)**		
(c)	Explain the term yoga and it's origin. Explain the role of yoga Asanas in day to day life of human being.	**(05)**		
Q6	Answer the following questions		3-4	
(a)	Explain the teachings and learning of Guru Nanak Dev	**(05)**		
(b)	Write a note on the journey of Prince Siddartha to Gautam Buddha.	**(10)**		
(c)	Explain the meaning of following dohas माटी कहे कुम्हार से, तू क्या रौंदे मोय। एक दिन ऐसा आएगा, मैं रौंदूगी तोय॥ गुरु गोविंद दोऊं खड़े, काके लागूं पांय। बलिहारी गुरु आपकी, गोविंद दियो बताय॥	**(05)**		
Q7	Answer the following questions	**(20)**		
(a)	Explain the various preachings of Jainism	**(10)**		
(b)	Write a note on linguistic history and tradition of India	**(10)**		

ALL THE BEST