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INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

Bargarh/Fulia/Guwahati/Jodhpur/Salem/Varanasi/Champa/Kannur/KHTI-Gadag/SPKM-Venkatagiri

Diploma in Handloom & Textile Technology

NOV/DEC-2024 SEMESTER EXAMINATION

(Regulation-2021)

Semester : II

Time:3 Hours

Course Code & Title : **BS102 Mathematics – II**

Maximum Marks: 100

PART-A

(10×2=20 Marks)

Answer all the questions within two to three sentences

1. If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$ then the value of 'α' for which $A^2 = B$
2. Solve the following equations by using Cramer's rule $3x + 2y = 62$, $4x + y = 56$
3. Evaluate $\int \cos^2 x \, dx$.
4. Evaluate integration by substitution method $\int 3x^2 \sin(x^3) dx$
5. Find the distance of the point P (2,3) from the x-axis.
6. Find the equation of a line parallel to $3x+4y = 5$ and passing through points (1,1).
7. The two vectors $\vec{u} = (2, -3)$ and $\vec{v} = (-8, 12)$ are parallel to each other find the angle between them.
8. Find the magnitude of the vector $\alpha \vec{u}$ if $\alpha = 2$ and $\vec{u} = (-2, 4, 1)$.
9. A random sample of size 25 from populations gives the sample of S.D 8.5. Test the hypothesis that the population S.D is 10.
10. Write the two applications of chi-square test.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. If $A = \begin{bmatrix} 2 & 6 \\ 1 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 7 & 3 \\ 8 & 2 \end{bmatrix}$ then find $2A+3B-I$ (6)
B. Solve the equations by Cramer's rule (10)
 $2x + y - z = 3$, $x + y + z = 1$, $x - 2y - 3z = 4$
(OR)
C. Show that $A^2 - 3I = 2A$ where $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ (6)
D. Find the inverse of $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 1 & 1 \end{bmatrix}$ (10)

12. A. Evaluate $\int x^2 e^{3x} dx$ (6)
 B. Evaluate $\int x \cos 2x dx$ (10)

(OR)

- C. Evaluate $\int_1^3 (3x^2 + x) dx$ (6)
 D. Evaluate $\int \frac{\sin x}{1 + \cos x} dx$ (10)
13. A. Show that the equation $4x^2 + 10xy + y^2 - 2x + 5y - 3 = 0$ represents a hyperbola. (6)
 B. Find the value of m if the points $(5,1)$ $(-2,-3)$ and $(8,2m)$ are collinear. (10)

(OR)

- C. Find the value of ' p ' such that $3x^2 + 2xy + py^2 + 7x + 17y - 6 = 0$ represents pair of straight lines. (6)
 D. If $(4, 1)$ is one end of the diameter of the circle $x^2 + y^2 - 2x + 6y - 15 = 0$, find the other end of the diameter? (10)
14. A. A particle acted on by the forces $3\vec{i} + 2\vec{j} - 3\vec{k}$ and $\vec{i} + 7\vec{j} + 7\vec{k}$ is displaced from the point $\vec{i} + 2\vec{j} + 3\vec{k}$ to the point $3\vec{i} - 5\vec{j} + 4\vec{k}$. Find the total work done by the forces. (6)
 B. Show that the points whose position vectors $2\vec{i} + 3\vec{j} + 4\vec{k}$, $3\vec{i} + 4\vec{j} + 2\vec{k}$ and $4\vec{i} + 2\vec{j} + 3\vec{k}$ form an equilateral triangles. (10)

(OR)

- C. Find the value of ' m ' so that $2\vec{i} - \vec{j} + \vec{k}$, $\vec{i} + 2\vec{j} - 3\vec{k}$ and $3\vec{i} + m\vec{j} + 5\vec{k}$ are coplanar. (6)
 D. Find the magnitude of torque about the point $(4, 3, -1)$ of the force represented by $6\vec{i} + \vec{j} - \vec{k}$ acting through the point $(0, 1, -1)$. (10)
15. A. The mean life time of a sample of 100 light bulbs produced by a company is computed to be 1570 hours with a S.D of 120 hours. If μ is the mean life time of all the bulbs produced by the company, test the hypothesis $\mu = 1600$ hours, against the alternative hypothesis $\mu \neq 1600$ hours with $\alpha = 0.05$ and 0.01 . (6)
 B. Two independent samples of 8 and 7 items respectively had the following values of (10)

the variable.

Sample 1	9	11	13	11	15	9	12	14
Sample 2	10	12	10	14	9	8	10	-

Do the two estimates of population variance differ significantly at 5% LOS?

(OR)

- C. The savings bank account of a customer showed an average balance of Rs.150 (6)
and a standard deviation of Rs.50. Assuming that the account balances are normally distributed.

(i) What percentage of account is over Rs.200?

(ii) What percentage of account is between Rs.120 and Rs.170?

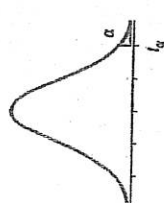
- D. 1000 students at college level were graded according to their I.Q and their economic (10)
conditions of their homes. What conclusion can you draw from the following data:

Economic conditions	I. Q. Level	
	High	Low
Rich	460	140
Poor	240	160

t-Table

ν	Probability				
	0.9	0.1	0.05	0.02	0.01
1	0.158	6.314	12.706	31.821	63.657
2	0.142	2.920	4.303	6.965	9.925
3	0.137	2.353	3.182	4.541	5.841
4	0.134	2.132	2.776	3.747	4.604
5	0.132	2.015	2.571	3.365	4.032
6	0.131	1.943	2.447	3.143	3.707
7	0.130	1.895	2.365	2.998	3.496
8	0.130	1.860	2.306	2.896	3.355
9	0.129	1.833	2.262	2.821	3.250
10	0.129	1.812	2.228	2.764	3.169
11	0.129	1.796	2.201	2.718	3.106
12	0.128	1.782	2.179	2.681	3.055
13	0.128	1.771	2.160	2.650	3.012
14	0.128	1.761	2.145	2.624	2.977
15	0.128	1.753	2.131	2.602	2.947
16	0.128	1.746	2.120	2.583	2.921
17	0.128	1.740	2.110	2.567	2.898
18	0.127	1.734	2.101	2.552	2.878
19	0.127	1.729	2.093	2.539	2.861
20	0.127	1.725	2.086	2.528	2.845
21	0.127	1.721	2.080	2.518	2.831
22	0.127	1.717	2.074	2.508	2.819
23	0.127	1.714	2.069	2.500	2.807
24	0.127	1.711	2.064	2.492	2.797
25	0.127	1.708	2.060	2.485	2.787
30	0.127	1.697	2.042	2.457	2.750
40	0.126	1.684	2.021	2.423	2.704
60	0.126	1.671	2.000	2.390	2.660
120	0.126	1.658	1.980	2.358	2.617
∞	0.126	1.645	1.960	2.326	2.576



Values of t_{α} 

ν	$\alpha = 0.10$	$\alpha = 0.05$	$\alpha = 0.025$	$\alpha = 0.01$	$\alpha = 0.00833$	$\alpha = 0.00625$	$\alpha = 0.005$
1	3.078	6.314	12.706	31.821	38.204	50.923	63.657
2	1.886	2.920	4.303	6.965	7.650	8.860	9.925
3	1.638	2.353	3.182	4.541	4.857	5.392	5.841
4	1.533	2.132	2.776	3.747	3.961	4.315	4.604
5	1.476	2.015	2.571	3.365	3.534	3.810	4.032
6	1.440	1.943	2.447	3.143	3.288	3.521	3.707
7	1.415	1.895	2.365	2.998	3.128	3.335	3.499
8	1.397	1.860	2.306	2.896	3.016	3.206	3.355
9	1.383	1.833	2.262	2.821	2.934	3.111	3.250
10	1.372	1.812	2.228	2.764	2.870	3.038	3.169
11	1.363	1.796	2.201	2.718	2.820	2.981	3.106
12	1.356	1.782	2.179	2.681	2.780	2.934	3.055
13	1.350	1.771	2.160	2.650	2.746	2.896	3.012
14	1.345	1.761	2.145	2.624	2.718	2.864	2.977
15	1.341	1.753	2.131	2.602	2.694	2.837	2.947
16	1.337	1.746	2.120	2.583	2.673	2.813	2.921
17	1.333	1.740	2.110	2.567	2.655	2.793	2.898
18	1.330	1.734	2.101	2.552	2.639	2.775	2.878
19	1.328	1.729	2.093	2.539	2.625	2.759	2.861
20	1.325	1.725	2.086	2.528	2.613	2.744	2.845
21	1.323	1.721	2.080	2.518	2.602	2.732	2.831
22	1.321	1.717	2.074	2.508	2.591	2.720	2.819
23	1.319	1.714	2.069	2.500	2.582	2.710	2.807
24	1.318	1.711	2.064	2.492	2.574	2.700	2.797
25	1.316	1.708	2.060	2.485	2.566	2.692	2.787
26	1.315	1.706	2.056	2.479	2.559	2.684	2.779
27	1.314	1.703	2.052	2.473	2.553	2.676	2.771
28	1.313	1.701	2.048	2.467	2.547	2.669	2.763
29	1.311	1.699	2.045	2.462	2.541	2.663	2.756
inf	1.282	1.645	1.960	2.326	2.394	2.498	2.576

Values of χ^2_{α}

ν	$\alpha = 0.995$	$\alpha = 0.99$	$\alpha = 0.975$	$\alpha = 0.95$	$\alpha = 0.05$	$\alpha = 0.025$	$\alpha = 0.01$	$\alpha = 0.005$
1	0.000393	0.00157	0.000982	0.00393	3.841	5.024	6.635	7.879
2	0.0100	0.0201	0.0506	0.103	5.991	7.378	9.210	10.597
3	0.0717	0.115	0.216	0.352	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	11.070	12.832	15.086	16.750
6	0.676	0.872	1.237	1.635	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.844	36.415	39.364	42.980	45.558
25	10.520	11.524	13.120	14.611	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	40.113	43.194	46.963	49.645
28	12.461	13.565	15.308	16.928	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	42.557	45.772	49.588	52.336
30	13.787	14.953	16.791	18.493	43.773	46.979	50.892	53.672
40	20.706	22.164	24.433	26.509	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	67.505	71.420	76.154	79.490
60	35.535	37.485	40.482	43.118	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	90.531	95.023	100.425	104.215
80	51.172	53.540	57.153	60.391	101.879	106.629	112.329	116.321
90	59.196	61.754	65.646	69.126	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	124.342	129.561	135.807	140.169

* This table is based on Table 8 of *Biometrika Tables for Statisticians*, Vol. 1, by permission of the Biometrika trustees.



Values of $F_{0.05}$

ν_2 = Degrees of freedom for denominator	ν_1 = Degrees of freedom for numerator																			
	1	2	3	4	5	6	7	8	9	10	12	15	20	25	30	40	60	120	∞	
1	161	200	216	225	230	234	237	239	241	242	244	246	248	249	250	251	252	253	254	
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.46	19.46	19.47	19.48	19.49	19.50	
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.63	8.62	8.59	8.57	8.55	8.53	
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63	
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.52	4.50	4.46	4.43	4.40	4.37	
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.82	3.81	3.77	3.74	3.70	3.67	
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.40	3.38	3.34	3.30	3.27	3.23	
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.11	3.08	3.04	3.01	2.97	2.93	
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.89	2.86	2.83	2.79	2.75	2.71	
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.73	2.70	2.66	2.62	2.58	2.54	
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.60	2.57	2.53	2.49	2.45	2.40	
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.50	2.47	2.38	2.38	2.34	2.30	
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.41	2.38	2.34	2.30	2.25	2.21	
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.34	2.31	2.27	2.22	2.18	2.13	
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.28	2.25	2.20	2.16	2.11	2.07	
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.23	2.19	2.15	2.11	2.06	2.01	
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.18	2.15	2.10	2.06	2.01	1.96	
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.14	2.11	2.06	2.02	1.97	1.92	
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88	
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.07	2.04	1.99	1.95	1.90	1.84	
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81	
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.02	1.98	1.94	1.89	1.84	1.78	
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.00	1.96	1.91	1.86	1.81	1.76	
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.97	1.94	1.89	1.84	1.79	1.73	
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71	
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.88	1.84	1.79	1.74	1.68	1.62	
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.78	1.74	1.69	1.64	1.58	1.51	
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.69	1.65	1.59	1.53	1.47	1.39	
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.60	1.55	1.50	1.43	1.35	1.25	
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.51	1.46	1.39	1.32	1.22	1.00	

Values of $F_{0.01}$

values of $F_{0.01}$		$\nu_1 = \text{Degrees of freedom for numerator}$																			
$\nu_2 = \text{Degrees of freedom for denominator}$		1	2	3	4	5	6	7	8	9	10	12	15	20	25	30	40	60	120	∞	
1		4.052	5.000	5.403	5.625	5.764	5.859	5.928	5.982	6.023	6.056	6.106	6.157	6.209	6.240	6.261	6.287	6.313	6.339	6.366	
2		98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39	99.40	99.42	99.43	99.45	99.46	99.57	99.47	99.48	99.49	99.50	
3		34.12	30.82	29.46	27.71	28.24	27.91	27.67	27.49	27.35	27.23	27.05	26.87	26.69	26.58	26.50	26.41	26.32	26.22	26.13	
4		21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55	14.37	14.20	14.02	13.91	13.84	13.75	13.65	13.56	13.46	
5		16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	9.89	9.72	9.55	9.45	9.38	9.29	9.20	9.11	9.02	
6		13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.72	7.56	7.40	7.30	7.23	7.14	7.06	6.97	6.88	
7		12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.47	6.31	6.16	6.06	5.99	5.91	5.82	5.74	5.65	
8		11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.67	5.52	5.36	5.26	5.19	5.12	5.03	4.95	4.86	
9		10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.11	4.96	4.81	4.71	4.65	4.57	4.48	4.40	4.31	
10		10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.71	4.56	4.41	4.31	4.25	4.17	4.08	4.00	3.91	
11		9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.40	4.25	4.10	4.01	3.94	3.86	3.78	3.69	3.60	
12		9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.16	4.01	3.86	3.76	3.70	3.62	3.54	3.45	3.36	
13		9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	3.96	3.82	3.66	3.51	3.41	3.35	3.27	3.18	3.09	
14		8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.80	3.66	3.51	3.41	3.35	3.27	3.18	3.09	3.00	
15		8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.67	3.52	3.37	3.28	3.21	3.13	3.05	2.96	2.87	
16		8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.55	3.41	3.26	3.16	3.10	3.02	2.93	2.84	2.75	
17		8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.46	3.31	3.16	3.07	3.00	2.92	2.83	2.75	2.65	
18		8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.37	3.23	3.08	2.98	2.92	2.84	2.76	2.67	2.58	
19		8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.30	3.15	3.00	2.91	2.84	2.78	2.69	2.61	2.52	
20		8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.23	3.09	2.94	2.84	2.78	2.69	2.61	2.52	2.42	
21		8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40	3.31	3.17	3.03	2.88	2.79	2.72	2.64	2.55	2.46	2.36	
22		7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	3.12	2.98	2.83	2.73	2.67	2.58	2.50	2.40	2.31	
23		7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30	3.21	3.07	2.93	2.78	2.69	2.62	2.54	2.45	2.35	2.26	
24		7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	3.03	2.89	2.74	2.64	2.58	2.49	2.40	2.31	2.21	
25		7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13	2.99	2.85	2.70	2.60	2.54	2.45	2.36	2.27	2.17	
30		7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.84	2.70	2.55	2.45	2.39	2.30	2.21	2.11	2.01	
40		7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.66	2.52	2.37	2.27	2.20	2.11	2.02	1.92	1.80	
60		7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.50	2.35	2.20	2.10	2.03	1.94	1.84	1.73	1.60	
120		6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.34	2.19	2.03	1.93	1.86	1.76	1.66	1.53	1.38	
∞		6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.18	2.04	1.88	1.77	1.70	1.59	1.47	1.32	1.00	

Registration Number

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INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

Bargarh/Fulia/Guwahati/Jodhpur/Salem/Varanasi/Champa/Kannur/KHTI-Gadag/SPKM-Venkatagiri

Diploma in Handloom & Textile Technology

NOV/DEC-2024 SEMESTER EXAMINATION

(Regulation-2021)

Semester : 02

Time:3 Hours

Course Code & Title : **BS103 : APPLIED PHYSICS**

Maximum Marks: 100

PART-A

(10×2=20 Marks)

Answer all the questions within two to three sentences

1. What is the unit of force in CGS and FPS system?
2. Give the dimensional formula for mass.
3. Define Hooke's law.
4. State Stoke's law.
5. Write the name of mode of heat transfer.
6. Define coefficient of thermal conductivity.
7. Define wave velocity.
8. State the total internal reflection.
9. Define Kirchhoff's law.
10. Write the classification of materials based on conductivity.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. Explain the dimensional equations and their applications. (6)
B. Check by dimensional analysis, whether the equation is correct: $v^2 = u^2 + 2as$, (10)
where 'v' is the final velocity, 'u' is the initial velocity, 'a' is the acceleration
& 's' is the displacement.
(OR)
C. Explain the limitations of dimensional analysis. (6)
D. Explain the different types of errors in measurement with an example. (10)
12. A. Define the Terminal velocity of a liquid with example. (6)
B. Explain the stress- strain curve. (10)

(OR)

- C. Define the laws of limiting friction. (6)
- D. How much force is required to stretch a steel wire to double its length? When its area of cross section is 2 sq.cm and Young's modulus is $2 \times 10^{11} \text{ N/m}^2$. (10)
13. A. Define coefficient of linear expansion. (6)
- B. Discuss about different modes of heat transfer in a body. (10)
- (OR)
- C. Derive a relationship between scales of temperature. (6)
- D. Derive the relationship between coefficient of linear expansion and volume expansion of solids. (10)
14. A. Define the transverse and longitudinal waves with examples. (6)
- B. What are the free, damped and forced vibrations? Give examples for each. (10)
- (OR)
- C. Distinguish between spontaneous emission and stimulated emission. (6)
- D. Describe a simple microscope with a neat sketch. (10)
15. A. Define ohm's law and verify it. (6)
- B. Derive the equation for equivalent capacitance, when the capacitors are connected in series and parallel. (10)
- (OR)
- C. Discuss about intrinsic semiconductors with a neat sketch. (6)
- D. Explain the construction and working of a P-N-P transistor. (10)

Registration Number

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INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

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Diploma in Handloom & Textile Technology

NOV/DEC-2024 SEMESTER EXAMINATION

(Regulation-2021)

Semester : 02

Time:3 Hours

Course Code & Title : **ES102: INTRODUCTION TO IT SYSTEM** Maximum Marks: 100

PART-A

(10×2=20 Marks)

Answer all the questions within two to three sentences

1. What is search engine? Give an example.
2. Differentiate between primary and secondary memory with an example.
3. What are features of Linux operating system?
4. Mention any four general purpose commands in Linux.
5. What is webpage?
6. List out some of the basic HTML tags.
7. What is software? Also mention its types.
8. What are the tools available in MS office suit?
9. What is keyword in C? Give an example.
10. Write the syntax of if-else statement in C language.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. Explain primary memory and its types in detail. (6)
B. Draw the architecture of a computer system and explain its major components. (10)
- (OR)
- C. Write short notes on secondary storage devices. (6)
D. How computers are classified? Explain its types in details. (10)
12. A. Write features of windows operating system. (6)
B. What are Unix commands? Give five examples of Unix commands. (10)

(OR)

- C. How Linux operating system is different from Unix operating system? (6)
- D. Explain Unix shell. (10)
13. A. Explain the structure of the HTML webpage with an example. (6)
- B. Explain image tag and its properties in HTML with sample code. (10)
- (OR)**
- C. Explain Cascading Style Sheets (CSS) with an example. (6)
- D. Explain basic HTML tags and its usage with sample code. (10)
14. A. What is power point presentation? Explain its features. (6)
- B. How MS word is different from MS Excel? Design and prepare a resume. (10)
- (OR)**
- C. Draw a flowchart to find biggest of two numbers using drawing toolbars in MS-Word. (6)
- D. How Open Office is different from MS-office? (10)
15. A. What is C language? Discuss its features and history. (6)
- B. What is token in C language? Write a program to check whether the given number is ODD or EVEN. (10)
- (OR)**
- C. Explain various data types available in C language with examples. (6)
- D. Explain conditional statements in C language. Write a program to find the sum of two numbers. (10)

Registration Number

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Diploma in Handloom & Textile Technology

NOV/DEC-2024 SEMESTER EXAMINATION

(Regulation-2021)

Semester : 02

Time:3 Hours

Course Code &Title : **ES104 Fundamentals of Electrical,
Electronics Engineering**

Maximum Marks:100

PART-A

(10×2=20 Marks)

Answer all the questions within two to three sentences

1. Define Resistance.
2. What is flip-flop?
3. Draw the symbol of Op-Amp.
4. Define Slew Rate.
5. Distinguish EMF and MMF.
6. State Lenz Law.
7. Define RMS Value.
8. Draw the Power Triangle.
9. Define transformation ratio.
10. What type of Motors using in Textile Industry?

PART-B

(6+10)×5=80 Marks)

Answer all the questions in detail

11. A. Briefly discuss about PN Junction diode. (6)
B. Explain in detail about the construction and working of MOSFET with suitable diagram. (10)

(OR)

- C. Draw the Logical Gates with Truth table. (6)
D. Discuss in detail about the Ripple UP Counter. (10)
12. A. Differentiate the characteristics of Practical and Ideal Op-Amp. (6)
B. Explain in detail about Closed loop configuration of Op-Amp and derive the Voltage Gain. (10)

(OR)

- C. Compare Differentiator and Integrator. (6)
- D. Explain about the Half Adder and Full Adder with suitable expression. (10)

- 13. A. Define i) Permeability ii) Reluctance iii) Leakage Factor. (6)
- B. With a neat diagram, Briefly explain about Hysteresis Loop. (10)

(OR)

- C. Give short note about Self and Mutual Induction with suitable expressions. (6)
- D. Write the analogy between Electric and Magnetic circuits. (10)

- 14. A. Define i) Power factor ii) Frequency iii) Average Value. (6)
- B. Derive Voltage and Current relationship in Star and Delta connection with suitable Diagram. (10)

(OR)

- C. Discuss about AC through Pure Inductor and Pure Capacitor. (6)
- D. Explain series R-C circuit with phasor diagram and derive the equation of impedance & phase angle. (10)

- 15. A. Briefly explain about Auto Transformer. (6)
- B. Explain in detail about construction and working principle of single phase Transformer and Derive the EMF equation. (10)

(OR)

- C. Draw the characteristic curves of various types of DC Motor. (6)
- D. With a neat sketch explain the construction and working of DC motor. (10)

Registration Number

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Diploma in Handloom & Textile Technology

NOV/DEC-2024 SEMESTER EXAMINATION

(Regulation-2021)

Semester : II Semester

Time:3 Hours

Course Code & Title : ES106- ENGINEERING MECHANICS

Maximum Marks: 100

PART-A

(10×2=20 Marks)

Answer all the questions within two to three sentences

1. Differentiate the statics and dynamics as applicable in applied mechanics.
2. State the Principle of transmissibility of force.
3. Define the term 'Free body diagram'
4. Draw the cantilever beam subjected to a point load at the free end and specify the support reactions.
5. Define the term 'Limiting friction'.
6. An object is placed on a rough inclined plane and is kept in static equilibrium by applying a horizontal force. Illustrate the situation using a line diagram, and specify all the forces acting on the object.
7. Mention the formula for the centroid of the semi-circle and the parallelogram.
8. Differentiate the centroid and the centre of gravity.
9. The velocity ratio of a simple lifting machine is 10 and the mechanical advantages is 8.5. Determine the efficiency of the machine.
10. What is a reversible machine?

PART-B

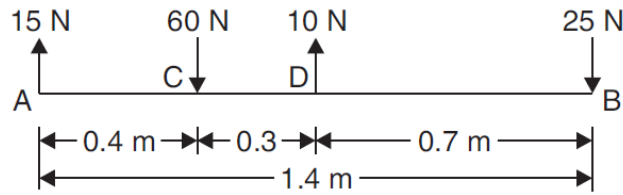
((6+10)×5=80 Marks)

Answer all the questions in detail.

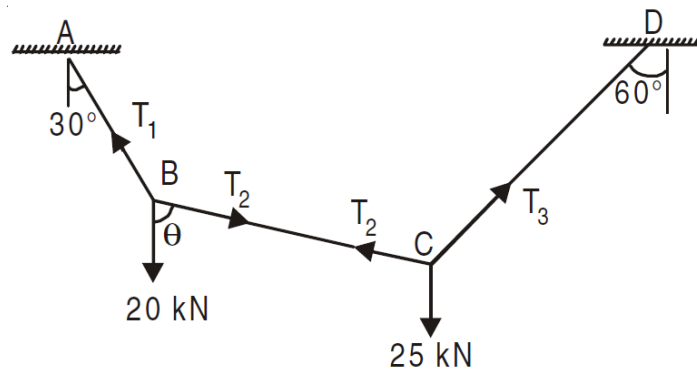
11. A. Enumerate the steps used to find the resultant of two forces using the 'Parallelogram law of forces with an example. (6)
B. The following forces (all pull) act at a point: (i) 25 N due North, (ii) 10 N North-East, (iii) 15 N due East, (iv) 20 N 30° East of South, (v) 30 N 60° South of West. Find the resultant force. What angle does it make with the East? (10)

(OR)

- C. Illustrate the 'Polygon law of forces' of three or more concurrent forces with an example. (6)
- D. A rigid bar is subjected to a system of parallel forces as shown in Fig. Reduce this system to a single force system, a single force moment system at B. (10)

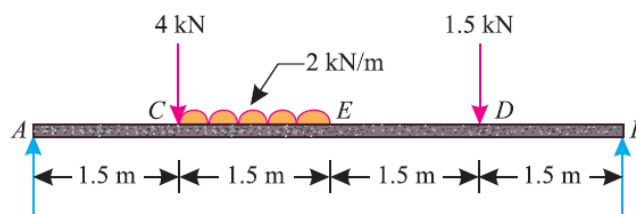


12. A. State and explain the 'Lami's theorem' of concurrent forces. (6)
- B. A wire is fixed at two points A and D as shown in Fig. Two weights 20 kN and 25 kN are supported at B and C, respectively. When equilibrium is reached it is found that the inclination of AB is 30° and that of CD is 60° to the vertical. Determine the tension in the segments AB, BC and CD of the rope and also the inclination of BC to the vertical. (10)

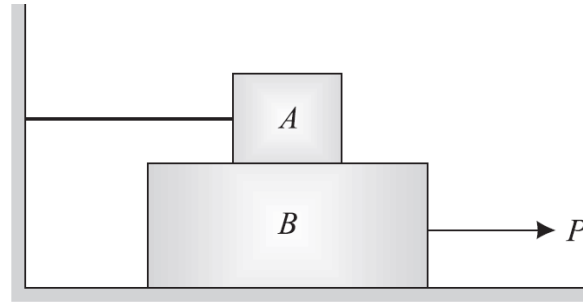


(OR)

- C. Classify the following with simple sketches: (i) Types of beams, and (ii) Types of loads acting on beams (6)
- D. Determine the support reactions at A and B for the simply supported beam shown in Fig. (10)



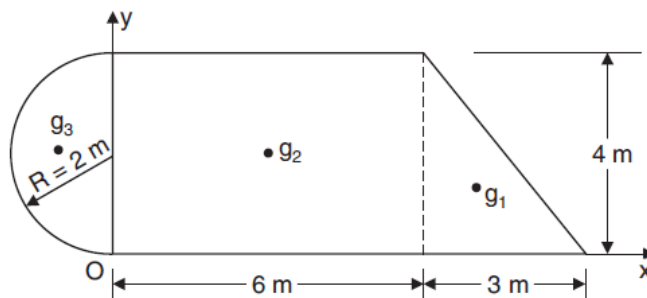
13. A. Define the co-efficient of friction and the angle of friction. Also, Illustrate the numerical relationship between the applied force 'F', the friction force ' F_f ', the co-efficient of friction ' μ ' and the angle of friction ' Φ '. (6)
- B. Block A weighing 1000 N rests over block B which weighs 2000 N as shown in Fig. Block A is tied to a wall with a horizontal string. If the coefficient of friction between A and B is 0.25 and that between B and the floor is 0.33, what value of force P is required to create impending motion if, (i) P is horizontal, and (ii) P acts 30° upwards to horizontal. (10)



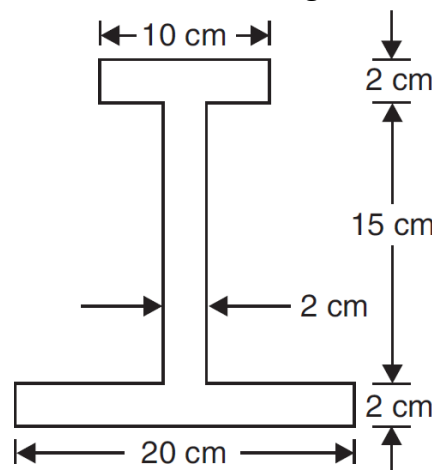
(OR)

- C. Compare the static and dynamic friction. Also, Establish relationship between friction angle and angle of repose . (6)
- D. Find the force required to move a load of 30 N up a rough inclined plane, the force being applied parallel to the plane. The inclination of the plane is such that when the same body is kept on a perfectly smooth plane inclined at that angle, a force of 6 N applied at an inclination of 30° to the plane keeps the same in equilibrium. Assume the co-efficient of friction between the rough plane and the load is equal to 0.3. (10)

14. A. Determine the centroids (g_1 , g_2 and g_3) of the individual geometries shown in Fig, with respect to the 'X' and 'Y' axes. (6)

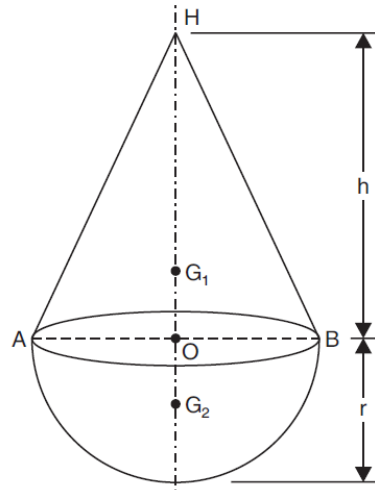


- B. Find the centroid of the I-section shown in Fig. (10)



(OR)

- C. A hemisphere and a cone have their bases joined together, the two bases being of the same size. Find the ratio of the height of the cone to the radius of the base, so that their common centre of gravity may be at the centre of the common base. (6)



- D. A frustum of a solid right circular cone having a base circle diameter of 100 mm, height of 100 mm and top diameter of 50 mm has an axial hole of diameter of 25 mm. The total vertical distance from the base to the apex point of the cone is 200 mm. Find the centre of gravity of the solid. (10)
15. A. Compare the load Vs effort characteristics of the ideal machine and the actual machine using the law of machine. (6)
- B. In a simple machine, whose velocity ratio is 30, a load of 2400 N is lifted by an effort of 150 N and a load of 3000 N is lifted by an effort of 180 N. Find the law of machine and calculate the load that could be lifted by a force of 200 N. Also, find the amount of effort wasted in overcoming the friction, mechanical advantage, and the efficiency of the machine. (10)
- (OR)**
- C. Draw the simple screw jack and specify all the features in it. Also, brief the working principle. (6)
- D. In a wheel and axle, the diameter of the wheel is 550 mm and the diameter of the axle is 200 mm. The thickness of the cord on the wheel is 4 mm and that on the drum is 8 mm. Find the velocity ratio of the machine. If the efficiency is 80% then find the effort required to raise a load of 150 N. (10)
