

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

APRIL/MAY-2024 SEMESTER EXAMINATION

(Regulation-2021)

Semester : 02

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 $A = \begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 8 & 9 \\ -1 & -4 \end{bmatrix}$, Find $A+B$ and $A - B$
2. From the determinant $\begin{vmatrix} 2 & 5 & 1 \\ 1 & -2 & 3 \\ -4 & 1 & 0 \end{vmatrix}$, write the minor value of the element "5"?
3. Evaluate: $\int \cos 10x \, dx$
4. Evaluate : $\int e^{-5x} dx$
5. Find the type conic for the equation $2x^2 + xy - 4y^2 + 2x - 3y + 1 = 0$
6. Find the Centre and radius of the circle $x^2 + (y + 2)^2 = 4$
7. Find the magnitudes of $\vec{a} = -2\vec{i} + 3\vec{j} - 2\vec{k}$ and $\vec{b} = 3\vec{i} - 3\vec{j} + \vec{k}$
8. If $\vec{a} = 2\vec{i} + \vec{j} - \vec{k}$ and $\vec{b} = \vec{i} - 2\vec{j} + 2\vec{k}$ find $3\vec{a} + 2\vec{b}$
9. Write any two uses of t- test.
10. Define Type I error and Type II error.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ Prove that $A^2 - 4A - 5I = 0$ (6)
- B. Find the inverse of the matrix $\begin{bmatrix} 1 & 1 & -1 \\ 2 & 1 & 0 \\ -1 & 2 & 3 \end{bmatrix}$ (10)
- (OR)
- C. If $\begin{vmatrix} 2 & 1 & 4 \\ 3 & x & -1 \\ 6 & -6 & 26 \end{vmatrix} = 0$, find the value of x. (6)

D. Solve the equations by using Cramer's rule : (10)

$$3x + 2y - 2z = 3, x + y + z = 3, 2x - y + z = 2$$

12. A. Evaluate : $\int (5x^2 + \frac{2}{x} - \frac{7}{x^4}) dx$ (6)

B. Evaluate : $\int x e^x dx$ using integration by Parts method. (10)

(OR)

C. Evaluate : $\int_0^{\pi/2} \sin^8 x dx$ (6)

D. Evaluate : $\int \frac{x+2}{x^2+4x-3} dx$ using substitution method. (10)

13. A. Show that the points A $(0, -\frac{3}{2})$, B(1,-1) and C(2,- $\frac{1}{2}$) are collinear. (6)

B. Find the eccentricity, Centre, foci and vertices and trace the curve of ellipse (10)

$$\frac{(x-3)^2}{25} + \frac{(y-2)^2}{16} = 1$$

(OR)

C. Find the equation of circle for which (3,4) and (2,-7) are the ends of it's diameter. (6)

D. Find the equation of straight line passing through the point (1,-1) and parallel to $x + 3y - 4 = 0$. (10)

14. A. Verify that $3\vec{i} + 4\vec{j} + 5\vec{k}$ and $10\vec{i} + 6\vec{j} - 8\vec{k}$ are Parallel vectors. (6)

B. A force $2\vec{i} + \vec{j} + \vec{k}$ acting on the particle, if the particle is displaced from $4\vec{i} + \vec{j} - 3\vec{k}$ to $5\vec{i} + 4\vec{j} + 2\vec{k}$. Find Work done by the force and Moment of force. (10)

(OR)

C. Find the value of 'm', if two vectors $2\vec{i} - \vec{j} + 3\vec{k}$ and $\vec{i} + m\vec{j} + 4\vec{k}$ are perpendicular. (6)

D. Find the angle between vectors $3\vec{i} - 2\vec{j} + 5\vec{k}$ and $2\vec{i} + \vec{j} + 2\vec{k}$. (10)

15. A. A ball pen manufacturer claims that the mean writing life of pens have 400 pages with S.D 20 pages. A sample of 100 pens selected and found that the mean lifetime was 390 pages, test at 5% level of significance. (6)

- B. A die is tossed and the following distribution of faces was observed: (10)

Face	1	2	3	4	5	6
Frequency	30	25	18	10	22	15

Can you say that the die is unbiased?

(OR)

- C. The mean life time of 25 bulbs is found to be 1550 hours with S.D of 120 (6)
hours. The company manufacturing the bulbs, claims that the average life of
their bulbs is 1600 hours. Is the claim acceptable at 5% level of significance?
- D. Two samples of sizes 9 and 8 give the sum of squares of deviations from their (10)
respective means equal to 160 and 91 respectively, can we conclude that the
samples are from same population.

BS102 – Applied Mathematics - II

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	3.83	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

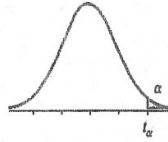
Values of $F_{0.01}$

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	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	99.47	99.48	99.49	99.50	99.50
3	34.12	30.82	29.46	28.24	27.91	27.67	27.49	27.35	27.23	27.13	27.05	26.97	26.89	26.82	26.76	26.71	26.66	26.62	26.58
4	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55	14.47	14.40	14.32	14.25	14.19	14.14	14.09	14.05	14.01
5	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	9.98	9.92	9.85	9.79	9.74	9.69	9.64	9.60	9.56
6	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.77	7.69	7.60	7.54	7.49	7.44	7.39	7.35	7.31
7	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.52	6.44	6.35	6.29	6.24	6.19	6.14	6.10	6.06
8	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.71	5.63	5.54	5.48	5.43	5.38	5.33	5.29	5.25
9	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.17	5.09	5.00	4.94	4.89	4.84	4.79	4.75	4.71
10	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.76	4.67	4.58	4.52	4.47	4.42	4.37	4.33	4.29
11	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.45	4.36	4.27	4.21	4.16	4.11	4.06	4.02	3.98
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.21	4.12	4.03	3.97	3.92	3.87	3.82	3.78	3.74
13	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	4.01	3.92	3.83	3.77	3.72	3.67	3.62	3.58	3.54
14	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.85	3.76	3.67	3.61	3.56	3.51	3.46	3.42	3.38
15	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.71	3.62	3.53	3.47	3.42	3.37	3.32	3.28	3.24
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.60	3.51	3.42	3.36	3.31	3.26	3.21	3.17	3.13
17	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.50	3.41	3.32	3.26	3.21	3.16	3.11	3.07	3.03
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.42	3.33	3.24	3.18	3.13	3.08	3.03	2.99	2.95
19	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.34	3.25	3.16	3.10	3.05	3.00	2.95	2.91	2.87
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.28	3.19	3.10	3.04	2.99	2.94	2.89	2.85	2.81
21	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40	3.31	3.22	3.13	3.04	2.98	2.93	2.88	2.83	2.79	2.75
22	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	3.17	3.08	2.99	2.93	2.88	2.83	2.78	2.74	2.70
23	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30	3.21	3.12	3.03	2.94	2.88	2.83	2.78	2.73	2.69	2.65
24	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	3.08	2.99	2.90	2.84	2.79	2.74	2.69	2.65	2.61
25	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13	3.04	2.95	2.86	2.80	2.75	2.70	2.65	2.61	2.57
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.89	2.80	2.71	2.65	2.60	2.55	2.50	2.46	2.42
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.71	2.62	2.53	2.47	2.42	2.37	2.32	2.28	2.24
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.54	2.45	2.36	2.30	2.25	2.20	2.15	2.11	2.07
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.38	2.29	2.20	2.14	2.09	2.04	1.99	1.95	1.91
∞	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.23	2.14	2.05	1.99	1.94	1.89	1.84	1.80	1.76

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

STATISTICAL TABLES

Values of t_{α} 

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

STATISTICAL TABLES

Values of χ^2_{α}

v	$\alpha = 0.995$	$\alpha = 0.99$	$\alpha = 0.975$	$\alpha = 0.95$	$\alpha = 0.05$	$\alpha = 0.025$	$\alpha = 0.01$	$\alpha = 0.005$	v
1	0.0000393	0.000157	0.000982	0.00393	3.841	5.024	6.635	7.879	1
2	0.0100	0.0201	0.0506	0.103	5.991	7.378	9.210	10.597	2
3	0.0717	0.115	0.216	0.352	7.815	9.348	11.345	12.838	3
4	0.207	0.297	0.484	0.711	9.488	11.143	13.277	14.860	4
5	0.412	0.554	0.831	1.145	11.070	12.832	15.086	16.750	5
6	0.676	0.872	1.237	1.635	12.592	14.449	16.812	18.548	6
7	0.989	1.239	1.690	2.167	14.067	16.013	18.475	20.278	7
8	1.344	1.646	2.180	2.733	15.507	17.535	20.090	21.955	8
9	1.735	2.088	2.700	3.325	16.919	19.023	21.666	23.589	9
10	2.156	2.558	3.247	3.940	18.307	20.483	23.209	25.188	10
11	2.603	3.053	3.816	4.575	19.675	21.920	24.725	26.757	11
12	3.074	3.571	4.404	5.226	21.026	23.337	26.217	28.300	12
13	3.565	4.107	5.009	5.892	22.362	24.736	27.688	29.819	13
14	4.075	4.660	5.629	6.571	23.685	26.119	29.141	31.319	14
15	4.601	5.229	6.262	7.261	24.996	27.488	30.578	32.801	15
16	5.142	5.812	6.908	7.962	26.296	28.845	32.000	34.267	16
17	5.697	6.408	7.564	8.672	27.587	30.191	33.409	35.718	17
18	6.265	7.015	8.231	9.390	28.869	31.526	34.805	37.156	18
19	6.844	7.633	8.907	10.117	30.144	32.852	36.191	38.582	19
20	7.434	8.260	9.591	10.851	31.410	34.170	37.566	39.997	20
21	8.034	8.897	10.283	11.591	32.671	35.479	38.932	41.401	21
22	8.643	9.542	10.982	12.338	33.924	36.781	40.289	42.796	22
23	9.260	10.196	11.689	13.091	35.172	38.076	41.638	44.181	23
24	9.886	10.856	12.401	13.848	36.415	39.364	42.980	45.558	24
25	10.520	11.524	13.120	14.611	37.652	40.646	44.314	46.928	25
26	11.160	12.198	13.844	15.379	38.885	41.923	45.642	48.290	26
27	11.808	12.879	14.573	16.151	40.113	43.194	46.963	49.645	27
28	12.461	13.565	15.308	16.928	41.337	44.461	48.278	50.993	28
29	13.121	14.256	16.047	17.708	42.557	45.772	49.588	52.336	29
30	13.787	14.953	16.791	18.493	43.773	46.979	50.892	53.672	30
40	20.706	22.164	24.433	26.509	55.758	59.342	63.691	66.766	40
50	27.991	29.707	32.357	34.764	67.505	71.420	76.154	79.490	50
60	35.535	37.485	40.482	43.118	79.082	83.298	88.379	91.952	60
70	43.275	45.442	48.758	51.739	90.531	95.023	100.425	104.215	70
80	51.172	53.540	57.153	60.391	101.879	106.629	112.329	116.321	80
90	59.196	61.754	65.646	69.126	113.145	118.136	124.116	128.299	90
100	67.328	70.065	74.222	77.929	124.342	129.561	135.807	140.169	100

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

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

APRIL/MAY-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 mass in CGS and FPS system.
2. Define least count with example.
3. Define elasticity.
4. Define moment of inertia.
5. Convert 0 °C into Fahrenheit scale.
6. Define coefficient of thermal conductivity.
7. Define wave velocity.
8. Write down the lens formula.
9. State Ohm's law
10. What are conductors? with example.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. What are the limitations of dimensional analysis? (6)
B. Check the dimensional analysis whether the given equation is correct or not: (10)
$$= mgh + \frac{1}{2}mv^2$$
, where E is the energy, m is the mass, g is the acceleration due to gravity, h is the height & v is the velocity.
(OR)
C. Explain the Significant figures and their examples. (6)
D. Explain the different types of errors in measurement with suitable examples. (10)
12. A. State the Stokes's law. Write down its applications. (6)

- B. Explain stress-strain curve with a neat sketch. (10)
- (OR)**
- C. Find the moment of inertia of a solid sphere of mass 18 kg and radius 6 meter (6)
rotating about an axis passing through its Centre and perpendicular.
- D. Define Friction. Explain different types of Friction in details. (10)
13. A. A material rod is 64.522 cm long at 12 °C and 64.576 cm at 90 °C. Find the (6)
coefficient of linear expansion of its solid materials.
- B. Explain the different modes of heat transfer with diagram. (10)
- (OR)**
- C. Explain the expansion of liquids. (6)
- D. Derive the expression for coefficient of linear, surface and volume expansion (10)
of solids.
14. A. Define the terms (a) Amplitude (b) Frequency and (c) Wavelength. (6)
- B. What are the free, damped and forced vibrations? Give examples for each. (10)
- (OR)**
- C. Explain the total internal reflection and Critical angle. (6)
- D. Explain the Laser and its characteristics (a) Stimulated absorption (10)
(b) Spontaneous emission and (c) Stimulated emission.
15. A. Derive the equations for total resultant resistance when resistances connected (6)
in series and parallel.
- B. Derive the equation for equivalent capacitance, when the capacitors are (10)
connected in series and parallel.
- (OR)**
- C. Distinguish between Intrinsic and Extrinsic Semiconductor. (6)
- D. Describe the working of N-P-N transistor with neat diagram. (10)

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Diploma in Handloom & Textile Technology

APRIL/MAY-2024 SEMESTER EXAMINATION

(Regulation-2021)

Semester : 02

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 . Write short notes of Varignon's Theorem.
- 2 . Two concurrent forces are 12N and 18N are acting at an angle of 60° to each other. Determine the resultant in magnitude and direction.
- 3 . What are the different types of supports and their reactions?
- 4 . What are the Types of beam?
- 5 . Define Co-efficient of friction.
- 6 . Define Angle of repose.
- 7 . What is meant by the Centre of gravity of an object?
- 8 . Write down the formula for Centroid of semi-circle with figure.
- 9 . What is the efficiency of the simple machine?
- 10 . Define ideal machine with example.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. If $\vec{P} = 6i + 12j - 5k$ and $\vec{Q} = -3i + 4j - 2k$ find (i) $4\vec{P} + 3\vec{Q}$ (6)
(ii) $2\vec{P} \times 3\vec{Q}$.
- B. Five forces acting on a particle is shown in fig. 11(b). Locate the resultant (10)
force.

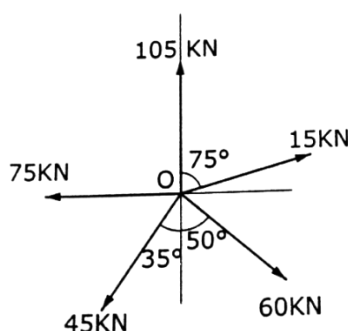


Fig.11(b)

(OR)

- C. Two concurrent forces acting at an angle of 30° . The resultant force is 15 N (6)
and one of the forces is 10N. Find the other force.
- D. Four coplanar concurrent forces are acting at a point as shown in fig.11 (d). (10)
One of the forces is unknown and its magnitude is shown by P. The resultant force is having a magnitude 520 N and is acting along Y axis (negative direction). Determine the unknown force P and its inclination with X axis.

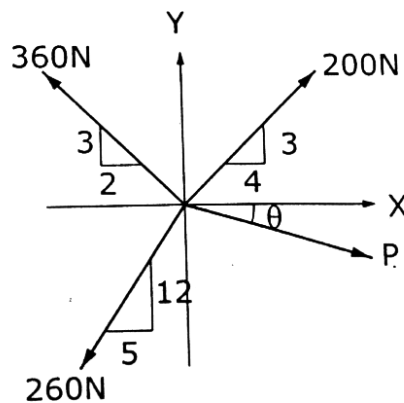


Fig.11(d)

12. A. An electric light fixture weighing 150 N hangs from a point C, by two strings (6)
AC and BC as shown in fig.12(a). Determine the forces in the string AC and BC.

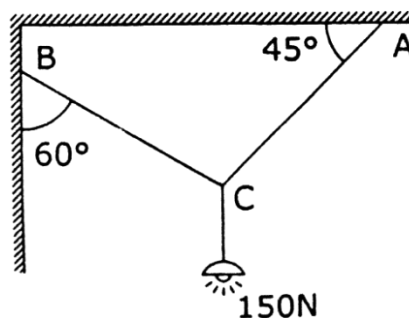


Fig. 12(a)

- B. State and prove Lami's Theorem. (10)

(OR)

- C. Find the support reactions at the fixed end of the cantilever beam shown in (6)
fig. 12(c).

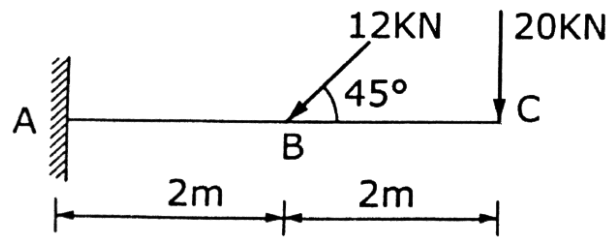


Fig. 12(c)

- D. Find the reactions at the supports A and B of the beam shown in fig. 12(d). (10)

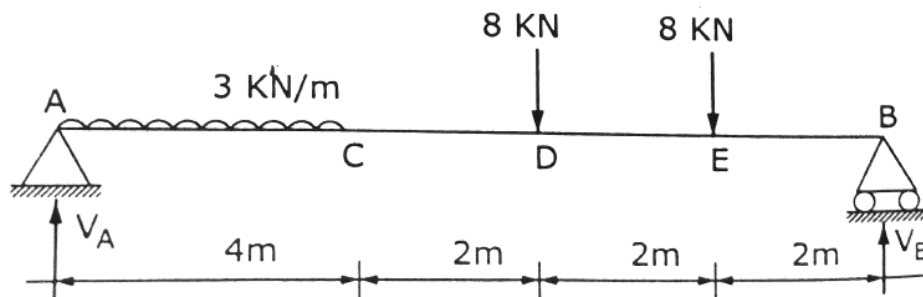


Fig. 12(d)

13. A. A man can pulled horizontally with a force of 450 N. A mass of 350 kg is resting on a horizontal surface for which the co-efficient of friction is 0.20. The vertical cable of a crane is attached to the top of the block as shown in fig. 13(a). What will be the tension in the cable is the man is just able to start the block to the right? (6)

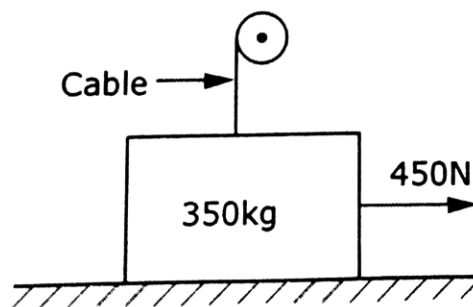


Fig. 13(a)

- B. A block of weight 1290 N on a horizontal surface and supports another block of weight 570 N on top of it as shown in fig.13(b). Find the force P applied to the lower block that will be necessary to cause slipping to impend. Coefficient of friction between block (1) and (2) is 0.25. Coefficient of friction between block (1) and surface is 0.40. (10)

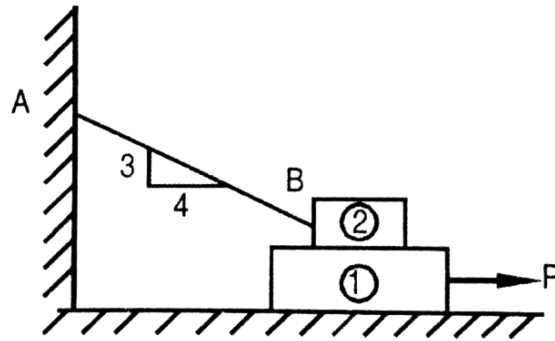


Fig. 13(b)

(OR)

- C. A block of weight 150 N is resting on a rough inclined plane as shown in fig.13(c). The block is tied up by a horizontal string, which has a tension of 50 N. Find (i) the frictional force on the block (ii) the normal reaction of the inclined plane (iii) the co-efficient of friction between the surfaces of contact. (6)

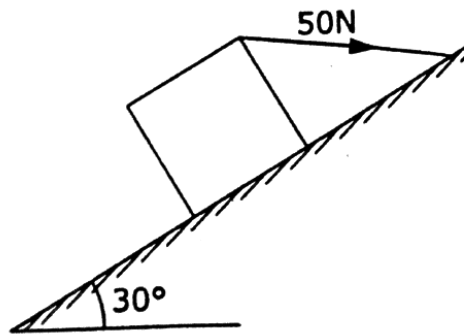


Fig. 13(c)

- D. What should the value of the angle θ of inclined plane in fig. 13(d) below which will make the motion of 390 N block down the plane to impend? The co-efficient of friction for all contact surfaces is $1/3$. (10)

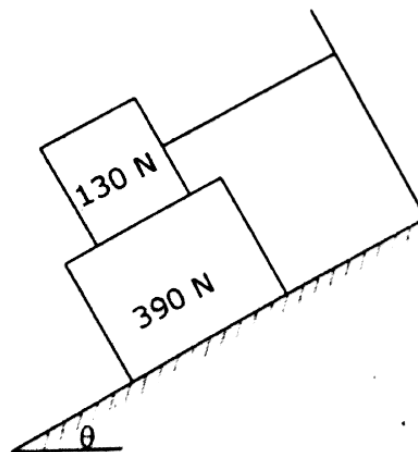


Fig. 13(d)

14. A. Locate the centroid of the cross-section area as shown in fig. 14(a). (6)

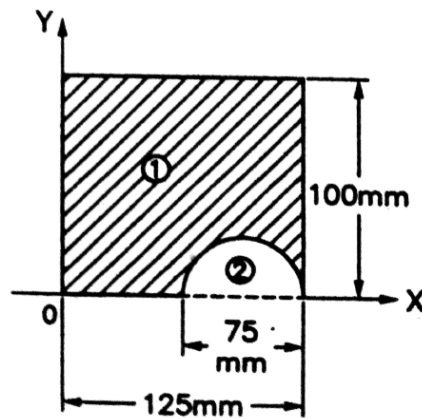


Fig. 14(a)

- B. Locate the centroid of area shown in fig. 14(b). (10)

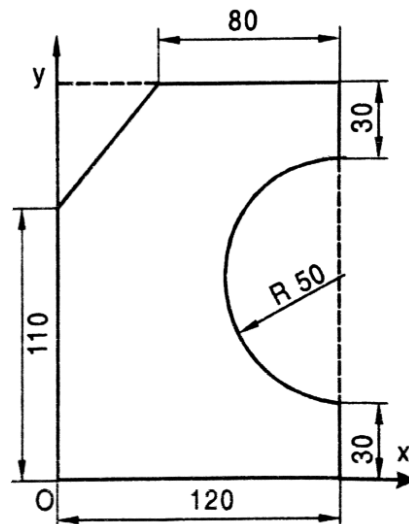


Fig. 14(b)

(OR)

- C. Locate the Centre of gravity of the given fig. 14(c). Assume the materials to be homogenous. (6)

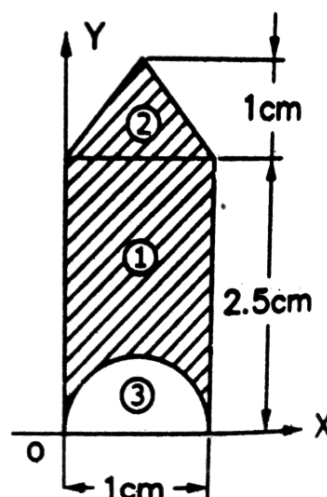


Fig. 14(c)

- D. Find the centroid of the unequal angle 120x80x10 mm, as shown in fig. 14(d). (10)
(All dimensions are in mm)

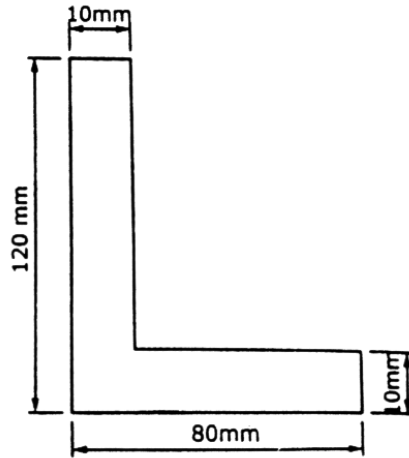


Fig. 14(d)

15. A. The efficiency of a lifting machine is 70 % when an effort of 10 N is required to raise a load of 500 N. Determine the mechanical advantage and velocity ratio of the machine. (6)
- B. Describe simple screw jack with M.A, V.R and efficiency. (10)
- (OR)**
- C. A single threaded worm and worm wheel, the number of teeth on worm wheel are 50. The diameter of effort wheel is 20 cm and that of the load drum is 10 cm. Find the effort required to lift a load of 300 N at an efficiency of 20 %. (6)
- D. Explain about differential axle and wheel with neat sketch and write the short notes of M.A, V.R and efficiency. (10)

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INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

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Diploma in Handloom & Textile Technology

APRIL/MAY-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. Draw the V-I characteristics of diode.
2. Draw the symbol of NAND & NOR Gate.
3. Mention the applications of Op-Amp.
4. Define CMRR.
5. What is reluctance?
6. Define power and energy.
7. Define form factor and peak factor.
8. Draw a phasor diagram of R-L circuits.
9. What are the types of transformer?
10. Mention the applications of Motor in Textile Industries.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. Differentiate MOS and CMOS. (6)
B. Explain the working principle and characteristics of FET. (10)
(OR)
C. Discuss about the Digital ICs. (6)
D. Construct the state table and explain the operation of D-Flip Flops. (10)
12. A. Compare the ideal and practical Op-Amp. (6)
B. Explain in details about adder and differentiator. (10)
(OR)
C. Compare Open loop and Closed loop configuration of Op-Amp. (6)

- D. What do you mean by inverting amplifier? Derive the expression for its output voltage. (10)
13. A. Explain in detail about the B-H curve. (6)
B. Explain the Statically and Dynamically induced EMF. (10)
- (OR)**
- C. Brief the following terms i) MMF ii) Current iii) Energy. (6)
D. Differentiate Electric and Magnetic circuit. (10)
14. A. Define i) RMS Value ii) Form Factor iii) Peak factor. (6)
B. Determine the Voltage and Current relationship in Star and Delta Connection with neat sketch. (10)
- (OR)**
- C. Draw and explain the power triangle. (6)
D. Explain series R-L circuit with phasor diagram and derive equation of impedance & phase angle. (10)
15. A. Draw the characteristics curves of various types of DC shunt Motors. (6)
B. Explain the construction and working principle of Squirrel Cage Induction Motor. (10)
- (OR)**
- C. Derive the EMF equation of Transformer. (6)
D. Explain the construction and working principle of Transformer. (10)

Registration Number

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Diploma in Handloom & Textile Technology

APRIL/MAY-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. Define hardware and software with example.
2. What is translator?
3. How CLI is different from GUI.
4. Explain portal with suitable example.
5. Write the full form of LAN, URL, WWW, and ALU.
6. Define webpage.
7. What is motherboard?
8. Explain Kernel.
9. Who invented C programming language? Also mention the year of invention.
10. Define keyword in C programming language.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. Explain Memory? Differentiate between web browser and search engine. (6)
B. What is computer? Discuss its characteristics. What are the different components of computer system? (10)
- (OR)
- C. Describe peripheral devices with example. Write the difference between input device and output device with suitable example. (6)
D. What is CPU? Compare and contrast internet and intranet. (10)
12. A. Define UNIX operating system. How UNIX is different from LINUX? Explain. (6)

- B. What is operating system? Discuss the types and functions of operating system. (10)

(OR)

- C. Explain UNIX Shell and its types. (6)
D. What are UNIX commands? Write the commands name with purpose used in UNIX operating system. (10)

13. A. Elaborate HTML with example. What are the features of HTML? (6)
B. What is heading tag? Briefly discuss all the versions and building block of HTML. (10)

(OR)

- C. Briefly explain CSS with syntax? Why we use CSS with HTML documents? Also discuss its advantages. (6)
D. What are the ways of inserting/adding CSS in HTML documents? Explain with example. (10)

14. A. Elaborate MS Publisher. What are the difference between Open Office and MS-Office? (6)
B. Explain Microsoft word. Prepare/Make a resume of yourself. Also write the procedure of preparing a resume. (10)

(OR)

- C. Define MS Excel. Also mention the applications of MS Excel. (6)
D. What is Microsoft office? Explain. (10)

15. A. What is program? Write a program in C programming language to perform subtraction of two numbers. (6)
B. Explain C language. How high level language is different from low level language. (10)

(OR)

- C. Explain data types used in C programming language. (6)
D. What are the conditional statements used in C programming language? Discuss its types with example. (10)
