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INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

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

Diploma in Handloom & Textile Technology

NOV/DEC-2025 SEMESTER EXAMINATION

(Regulation-2021)

Semester : I

Time:3 Hours

Course Code & Title : **BS101 MATHEMATICS-I**

Maximum Marks: 100

PART-A

(10×2=20 Marks)

Answer all the questions within two to three sentences

1. Calculate the degree value equal to 6 radians
2. Find the value of $\cos 75^\circ$
3. Find the value of $\lim_{x \rightarrow -2} (3x^4 + 2x^2 + x - 1)$
4. Write the definition of limit of a function
5. Find the Number of ways of arrangement of the letters from the word 'PERMUTATION'
6. Find the value of $50C_{47}$
7. Write any two axioms of Probability
8. Define Probability of an Event
9. Find the mean value of 120, 127, 152, 157, 160, 134, 137, 123, 140, 144
10. Write formula to find the control limits of P-Chart

PART-B

(6+10) ×5=80 Marks)

Answer all the questions in detail

11. A. Prove that $\frac{\sin 3A}{1 + 2 \cos 2A} = \sin A$ (6)

B. Find the value of $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$ by using trigonometric formula (10)

(OR)

C. Find the value of $3 \sin 40^\circ - 4 \sin^3 40^\circ$ (6)

D. Prove that $\frac{\sin 2A}{1 + \cos 2A} = \tan A$ and hence find the value of $\tan 15^\circ$ and (10)

$$\tan \left(22 \frac{1}{2} \right)^\circ$$

12. A. If $y = \log(\sec x + \tan x)$ find $\frac{dy}{dx}$ (6)

B. Differentiate $y = \frac{\sqrt{x}-1}{\sqrt{x}+1}$ with respect to x (10)

(OR)

C. Find the value of $\lim_{x \rightarrow 0} \frac{5x-8x^2}{2x^2-3x}$ (6)

D. If $y = x^2 \sin 2x$, find $\frac{dy}{dx}$ (10)

13. A. If $n_{p_4} = 1680$ find the value of n (6)

B. Expand $(2x+3)^5$ by binomial theorem (10)

(OR)

C. Prove that $10_{C_2} + (2 \times 10_{C_3}) + 10_{C_4} = 12_{C_4}$ (6)

D. Find the middle term in the expansion of $(2x - \frac{x^2}{4})^{16}$ (10)

14. A. State and prove addition theorem of probability (6)

B. A bag contains 12 blue balls and 'X' red ball if 1 ball is drawn at random (10)

(i) What is the probability that it will be red ball

(ii) If 8 more red ball added in bag and the probability drawn a red ball is twice the probability of red ball

(iii) find 'X' value

(OR)

C. Let A and B be the events such that $P(A)=7/13$, $P(B)=9/13$, $P(A \cap B) = 4/13$ (6)

find: (i) $P(A/B)$ (ii) $P(B/A)$ (iii) $P(A \cup B)$

D. State and prove Baye's theorem (10)

15. A. The data given below are the Number of defectives in 10 samples of 100 items each construct an np-chart and comment on the results (6)

Sample No	1	2	3	4	5	6	7	8	9	10
No of defectives	6	16	7	3	8	12	7	11	11	4

- B. Draw X-Chart and R-Chart for the following data sample size 5 (10)

Sample No	1	2	3	4	5	6	7	8	9	10
Mean ($\bar{X}$)	14	15	14	13	12	10	16	17	18	20
Range (R)	3	1	2	1	1	1	2	2	3	4

(OR)

- C. Explain about control Chart with type (6)
- D. Draw the C-Chart and state the conclusion for the following data (10)

Sample No	1	2	3	4	5	6	7	8	9	10
No of defectives	19	10	8	12	15	22	7	13	18	13

Table : Quality Control - Chart Constants

Sample Size	Chart for average $\bar{X}$ -chart			σ -chart — Chart for Standard Deviations					Chart for Ranges — R-chart				
	Factors for Control Limits			Factors for Central line	Factors for Control Limits				Factors for Central line	Factors for Control Limits			
n	A	A_1	A_2	C_2	B_1	B_2	B_3	B_4	d_2	D_1	D_2	D_3	D_4
2	2.121	3.760	1.880	0.5642	0	1.843	0	3.267	1.128	0	3.686	0	3.262
3	1.732	2.394	1.023	0.7236	0	1.858	0	2.568	1.663	0	4.358	0	2.575
4	1.500	1.880	0.729	0.7979	0	1.808	0	2.266	2.059	0	4.698	0	2.282
5	0.342	1.596	0.577	0.8407	0	1.756	0	2.089	2.326	0	4.918	0	2.115
6	1.225	1.410	0.483	0.8696	0.026	0.711	0.030	1.970	2.534	0	5.078	0	2.004
7	1.134	1.277	0.419	0.8882	0.105	1.672	0.118	1.882	2.704	0.205	5.203	0.076	1.924
8	1.061	1.175	0.373	0.9027	0.167	1.638	0.185	1.815	2.847	0.387	5.307	0.136	1.864
9	1.000	1.094	0.337	0.9139	0.219	1.609	0.239	1.760	2.970	0.546	5.394	0.184	1.816
10	0.949	1.028	0.308	0.9227	0.262	1.584	0.284	1.716	3.078	0.687	5.469	0.223	1.777
11	0.905	0.973	0.285	0.9300	0.299	1.561	0.321	1.679	3.173	0.812	5.534	0.256	1.744
12	0.866	0.925	0.266	0.9359	0.331	1.541	0.354	1.646	3.258	0.924	5.592	0.284	1.716
13	0.832	0.884	0.249	0.9410	0.359	1.523	0.382	1.618	3.336	1.026	5.646	0.308	1.692
14	0.802	0.848	0.235	0.9453	0.384	1.507	0.406	1.594	3.407	1.121	5.693	0.329	1.671
15	0.775	0.816	0.223	0.9490	0.406	1.492	0.428	1.572	3.472	1.207	5.737	0.348	1.652
16	0.750	0.788	0.212	0.9523	0.427	1.478	0.448	1.552	3.532	1.285	5.779	0.364	1.636
17	0.728	0.762	0.203	0.9551	0.445	1.465	0.466	1.534	3.588	1.359	5.817	0.379	1.621
18	0.707	0.738	0.194	0.9576	0.461	1.454	0.482	1.518	3.640	1.426	5.854	0.392	1.608
19	0.688	0.717	0.184	0.9599	0.477	1.443	0.497	1.503	3.689	1.490	5.888	0.404	1.596
20	0.671	0.697	0.110	0.9619	0.491	1.433	0.510	1.490	3.735	1.544	5.922	0.418	1.586

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Diploma in Handloom & Textile Technology

NOV/DEC-2025 SEMESTER EXAMINATION

(Regulation-2021)

Semester : I

Time:3 Hours

Course Code & Title : **BS105 Applied Chemistry**

Maximum Marks:100

PART-A

(10×2=20 Marks)

Answer all the questions within two to three sentences

1. Write Heisenberg's uncertainty principle.
2. How will you calculate the mole fraction?
3. Define: Alkalinity.
4. What are scale and sludge?
5. Define: Composites. Give examples.
6. What is an alloy? Give examples.
7. What is a calorific value of a fuel?
8. Define: Cetane Number.
9. What are non-electrolytes? Give an example.
10. What is redox reaction? Give an example.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. What are solute, solvent and solution? Give examples. (6)
B. Write a detailed note on Rutherford's atomic model with a neat sketch. (10)
- (OR)
- C. What is Hund's rule? Write any one example in detail. (6)
D. Explain the anomalous properties of NH₃ and H₂O based on Hydrogen bonding. (10)
12. A. What are priming and foaming? Write their causes and prevention. (6)
B. Briefly explain the municipal water treatment with a suitable diagram (10)

(OR)

- C. Explain the problems caused by the use of hard water in boilers. (6)
- D. What is soda lime process? Write the differences between hot and cold lime soda processes. (10)
13. A. Write the purpose of alloying in detail. (6)
- B. Write a note on general principle and processes of extraction of metal from their ores. (10)
- (OR)**
- C. Explain the vulcanization of rubber. Distinguish thermoplastics and thermosettings. (6)
- D. Write down the preparation and applications of PS and PVC? (10)
14. A. Write the chemical composition, calorific value and applications of producer gas. (6)
- B. How will you determine the quality of a coal using Proximate analysis? (10)
- (OR)**
- C. Write the mechanism of hydrodynamic lubrication. (6)
- D. Write in detail the physical properties of lubricants. (10)
15. A. Distinguish primary and secondary cell. (6)
- B. Write down the mechanism of electrochemical corrosion. (10)
- (OR)**
- C. Explain the heat treatment of alloys. (6)
- D. Explain the principle and working of lead storage battery. (10)
