**Registration Number** | | | | | | | | |

**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

**April/ May - 2026 Semester Examination**

(Regulation-2025)

Semester : II Time:3 Hours

Course Code & Title : **25BS102 Mathematics -II** Maximum Marks: 100

## PART-A (10×2=20 Marks)

**Answer all the questions within two to three sentences**

1. Given $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -1 & 3 \\ -1 & 0 & 2 \end{bmatrix}$, find $2A - B$.
2. Find the adjoint of the matrices $A = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$.
3. Evaluate $\int e^{-2x} dx$.
4. Integrate $\int (x+1)(x+2) dx$.
5. Find the distance between the points $(2,3)$ and$(4,1)$.
6. Find the slope of the straight line passing through the points $(5,7)$and $(7,5)$.
7. Find unit vector in the direction of vector $\vec{a} = \overrightarrow{2\imath} + 3\vec{\jmath} + \vec{k}$ .
8. Find the sum of the vectors $\vec{a} = 2\vec{\imath} - \vec{\jmath} \mp \vec{k}$ and $\vec{b} = -\vec{\imath} + \vec{\jmath} \mp 3\vec{k}$ .
9. Find the mean of 5 numbers 8,2,4,5 and 6.
10. List the control charts for attributes.

## PART-B ((6+10)×5=80 Marks)

**Answer all the questions in detail**

11. A. Find minors and cofactors of the elements of the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ (6)

**(OR)**

B. Show that the matrix $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 4A + I = 0$. (6)

C. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$,then verify that$(AB)^{-1} = B^{-1}A^{-1}$. (10)

**(OR)**

D. Solve the equations by Cramer's Rule (10)
$3x + y + 2z = 3, 2x - 3y - z = -3, x + 2y + z = 4.$

12. A. Evaluate $\int \frac{x^2}{1+x^6}\, dx$ (6)

**(OR)**

B. Evaluate $\int cos^2 x\, dx$ (6)

C. Integrate $\int x^2 cosax\, dx$ (10)

**(OR)**

D. Integrate $\int_0^{\pi/2} cos^9 x\, dx.$ (10)

13. A. Find the perpendicular distance of the point $(3, -5)$ from the line $3x - 4y - 26 = 0$ (6)

**(OR)**

B. Show that the points $A(3,1), B(6,4)$ and $C(8,6)$ are collinear (6)

C. Show that the points $(1, 7), (4, 2), (-1, -1)$ and $(-4, 4)$ are the vertices of a square. (10)

**(OR)**

D. Find the equation of a parallel line and a perpendicular line passing through the point $(1,2)$ to the line $3x + 4y = 7$. (10)

14. A. Find the direction cosines of the vector $\vec{i} + \overrightarrow{2j} + 3\vec{k}$ (6)

**(OR)**

B. Find a vector of magnitude $11$ in the direction opposite to that of $\overrightarrow{PQ}$ where $P$ and $Q$ are the points $(1,3,2)$ and $(-1,0,8)$ respectively. (6)

C. Show that the points A $(2\vec{i} - \vec{j} + \vec{k})$, B $(\vec{i} - \overrightarrow{3j} - 5\vec{k})$, C $(3\vec{i} - 4\vec{j} - \overrightarrow{4k})$ are the vertices of a right angled triangle. (10)

**(OR)**

D. Find the angle $'\theta'$ between the vectors $\vec{a} = \vec{i} + \vec{j} - \vec{k}$ and $\vec{b} = \vec{i} - \vec{j} + \vec{k}$. (10)

15. A. Find the variance and standard deviation from the following data. (6)

| x | 6 | 10 | 14 | 18 | 24 | 28 | 30 |
|---|---|---|---|---|---|---|---|
| f | 2 | 4 | 7 | 12 | 8 | 4 | 3 |

**(OR)**

B. Find the value of Co-efficient of Variation. If mean value is 44.6 and standard deviation value is 15.09. (6)

C. Given below are the values of sample mean $\bar{X}$ and sample range R for 10 samples, each of size 5. Draw the appropriate $\bar{X}$ chart. Comment on the state of control of the process. (10)

| Sample no | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean $\bar{X}$ | 43 | 49 | 37 | 44 | 45 | 37 | 51 | 46 | 43 | 47 |
| Range $R_i$ | 5 | 6 | 5 | 7 | 7 | 4 | 8 | 6 | 4 | 6 |

**(OR)**

D. 15-Tape recorders were examined for quality control test. The number of defects in each tape recorder is recorded below. Draw the appropriate $C$-chart and comment on the state of control. (10)

| Unit No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. of. defective | 2 | 4 | 3 | 1 | 1 | 2 | 5 | 3 | 6 | 7 | 3 | 1 | 4 | 2 | 1 |

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## 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 | 7.8407 | 0 | 1.756 | 0 | 2.089 | 2.326 | 0 | 4.918 | 0 | 2.115 |
| 6 | 1.225 | 1.410 | 0.483 | 0.8686 | 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 | 1534 | 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

**April/ May - 2026 Semester Examination**

(Regulation-2025)

Semester : **II** Time:3 Hours

Course Code & Title : **25BS103 Applied Physics** Maximum Marks: 100

## PART-A (10×2=20 Marks)

**Answer all the questions within two to three sentences**

1. Define least count with example.
2. Write down the dimensional formula of Force.
3. State Newton's laws of Gravitation.
4. Define Terminal velocity.
5. Convert 60℃ into Kelvin scale.
6. Write down the concept of temperature.
7. Define wavelength.
8. Write laws of refraction of light.
9. Write down the factors affecting the heating effect of electric current.
10. Draw a neat circuit diagram of CE configuration of a NPN transistor.

## PART-B ((6+10)×5=80 Marks)

**Answer all the questions in detail**

11. A. What are the limitations of dimensional analysis? (6)

**(OR)**

B. Explain the Significant figures and their examples. (6)

C. Check the dimensional analysis whether the given equation is correct or not: (10)
$E = mgh + \frac{1}{2}mv^2$ , 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)**

D. Explain the different types of errors in measurement. (10)

12. A. State Hooke's law. Write down its application. (6)

**(OR)**

B. Discuss the effect of temperature and impurity on surface tension. (6)

C. How much force is required to stretch a wire to double its length? When its area of cross section is 2 sq.cm and Young's modulus of the wire is $7.68 \times 10^{11}\ Nm^{-2}$. (10)

**(OR)**

D. Write the Significance of Stress and Strain curve with neat diagram. (10)

13. A. Explain the expansion of liquids. (6)

**(OR)**

B. Define coefficient of thermal conductivity. Write a note on it. (6)

C. Derive the relationship between coefficient of linear, surface and cubical expansion of solids. (10)

**(OR)**

D. Explain the different modes of heat transfer with diagram. (10)

14. A. An object is placed 20 cm in front of a concave lens of focal length 15 cm. Find the position and nature of the image formed. (6)

**(OR)**

B. Differentiate between transverse and longitudinal waves with example. (6)

C. Explain concept of total internal reflection with suitable diagram. (10)

**(OR)**

D. Explain the following terms with an example: - (10)
(a) Free Vibration, (b) Damped Vibration, (c) Forced Vibration.

15. A. Define the terms with its unit: (6)
a) Electric Current, b) Potential Difference, c) Electric power.

**(OR)**

B. Define a p–n junction diode. Draw and explain the V–I characteristics curve under forward and reverse bias. (6)

C. Derive the equation for effective resistance for the resistance connected in series and parallel. (10)

**(OR)**

D. Explain the construction and working of a P-N-P transistor. (10)

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Diploma in Handloom & Textile Technology

**April / May - 2026 Semester Examination**

(Regulation-2025)

Semester : **II** Time:3 Hours

Course Code &Title : **25ES102 Introduction to IT System** Maximum Marks:100

**PART-A** (10×2=20 Marks)

**Answer all the questions within two to three sentences**

1. Define Computer system
2. What is the Internet?
3. Define Operating System.
4. Write any two UNIX commands.
5. State the concept of Artificial Intelligence.
6. Write the use of OpenOffice Writer.
7. Mention the purpose of an HTML tag.
8. What is CSS?
9. Write any two control statements in C – Programming language.
10. Define user defined function in C – Programming language.

**PART-B** **(**(6+10) ×5=80 Marks)

**Answer all the questions in detail**

11. A. Explain the basic components of a computer system. (6)

**(OR)**

B. Describe the different types of computers. (6)

C. Explain the generations of computers with their characteristics. (10) (10)

**(OR)**

D. Explain about E- mail with an example. (10)

12. A. Define Operating System and explain its functions. (6)

**(OR)**

B. Classify the different types of Operating Systems. (6)

C. Explain UNIX operating system and basic shell commands. (10)

**(OR)**

D. Write the differences between UNIX and LINUX operating system. (10)

13. A. Explain the features of OpenOffice Writer. (6)

**(OR)**

B. Outline OpenOffice Calc and its applications. (6)

C. Explain the types of artificial intelligence and its characteristics? (10)

**(OR)**

D. Discuss importance of Artificial Intelligence in real-world systems. (10)

14. A. Explain the structure of an HTML document. (6)

**(OR)**

B. Write basic HTML tags used in web page design. (6)

C. Explain CSS and its types with examples. (10)

**(OR)**

D. Design a simple HTML webpage using lists and tables. (10)

15. A. Explain data types and variables in C programming. (6)

**(OR)**

B. Illustrate the operators in C with examples. (6)

C. Outline the basic conditional statements in C programming with examples. (10)

**(OR)**

D. Define C- Program? Write a C - Program to find sum of two numbers. (10)

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**April/ May - 2026 Semester Examination**

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Semester : **II** Time:3 Hours

Course Code & Title : **25ES104 Fundamentals of Electrical Electronic Engineering** Maximum Marks: 100

## PART-A (10×2=20 Marks)

**Answer all the questions within two to three sentences**

1. Write any two active and passive components.
2. What is flip-flop?
3. Draw the diagram of op-amp.
4. Define the CMRR and Slew Rate of the op-amp.
5. Define the magnetic flux density and magnetic field strength.
6. Define leakage factor.
7. Define the frequency and power factor of a signal.
8. Draw the phasor diagram of the series R-C circuit.
9. Write the formula of the transformation ratio of the transformer.
10. Write the applications of DC Motors.

## PART-B ((6+10)×5=80 Marks)

**Answer all the questions in detail**

**11. A.** Define and write the truth table of the AND, OR, and NOT gates. **(6)**

**(OR)**

**B.** Write the working principle of the BJT **(6)**

**C.** Explain the working of P-N junction diode. Draw the V-I characteristics of the diode. **(10)**

**(OR)**

**D.** Explain Ideal /Non-ideal voltage/current source with appropriate diagrams. **(10)**

**12. A.** Derive the output equation of the summing inverting op-amp circuit. **(6)**

**(OR)**

**B.** Derive the closed-loop voltage gain for the Non-Inverting ideal Op-amp. **(6)**

**C.** Derive the output equation for the integrator and write the applications of integrator. **(10)**

**(OR)**

| | | | |
|---|---|---|---|
| | **D.** | Draw and explain block diagram of Op-Amp. | **(10)** |
| **13.** | **A.** | Explain the B-H curve in detail. | **(6)** |
| | | **(OR)** | |
| | **B.** | Write Faraday laws of electromagnetic induction. | **(6)** |
| | **C.** | Write analogy between the electrical and magnetic circuits. | **(10)** |
| | | **(OR)** | |
| | **D.** | Write a Short notes on the Self-inductance and mutual inductance. | **(10)** |
| **14.** | **A.** | Define i) Form factor ii) Peak factor iii) Frequency | **(6)** |
| | | **(OR)** | |
| | **B.** | Derive the expression for RMS value and average value of sinusoidal waveform. | **(6)** |
| | **C.** | Derive the phase and line relationship for current and voltage for star connection and delta connection with diagrams. | **(10)** |
| | | **(OR)** | |
| | **D.** | Explain series R-L-C circuit with phasor diagram. Derive the resonance frequency. | **(10)** |
| **15.** | **A.** | Explain the construction of the single-phase DC motor. | **(6)** |
| | | **(OR)** | |
| | **B.** | Write the short notes on an Autotransformer. | **(6)** |
| | **C.** | Explain the construction and working of the single-phase transformer. Also, derive the EMF expression for the transformer | **(10)** |
| | | **(OR)** | |
| | **D.** | Explain the construction and working principle of induction motor. | **(10)** |

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**April / May - 2026 Semester Examination**

(Regulation-2025)

Semester : **II** Time:3 Hours

Course Code & Title : **25ES106 Engineering Mechanics** Maximum Marks: 100

**PART-A** (10×2=20 Marks)

**Answer all the questions within two to three sentences**

1. Two forces are 400N and 600N act at an angle of $60^0$ to each other. Determine the resultant in magnitude and direction
2. Write the three Equations of Linear Motion.
3. What are the types of Beams.
4. What are the types of Supports.
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. Define ideal machine with example.
10. Distinguish between reversible machine and non-reversible machine.

**PART-B** **(**(6+10)×5=80 Marks)

**Answer all the questions in detail**

11. A. Derive and express of Parallelogram Law of Forces. (6)

**(OR)**

B. Three coplanar concurrent forces are acting at a point as a shown in fig.11(b). Determine the resultant in magnitude and direction. (6)

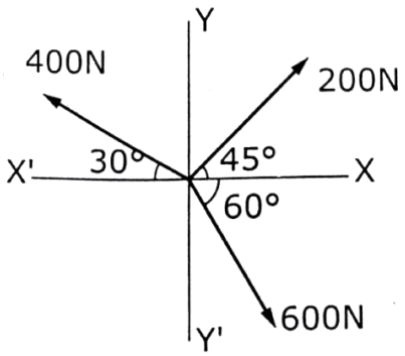


Fig.11(b)

C. Five coplanar concurrent forces are acting at a point as shown in Fig.11(c) (10)
Determine the resultant in magnitude and direction.

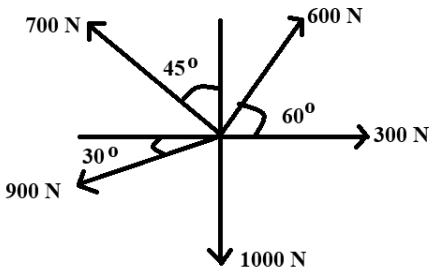


Fig.11(c)

**(OR)**

D. A motor starts from rest and uniformly accelerated to speed of 20 kmph over a distance of 200 m. calculated the acceleration and time taken. If further acceleration raises the speed to 50 kmph in 8 seconds, find the acceleration and the further distances moved? (10)

12. A. A Block weighing 5 kN is suspended from the ceiling by a chain. It is pulled aside by a horizontal chord until the chain makes $60^0$ with the ceiling as shown in fig. 12(a). Find the tension in the chain and in the chord by applying Lami's theorem. (6)

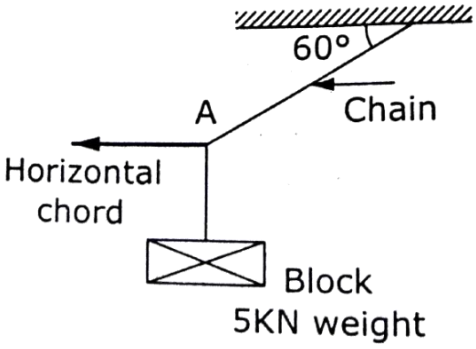


Fig.12(a)

**(OR)**

B. Find the support reactions at the fixed end of the cantilever beam shown in fig. 12(b). (6)

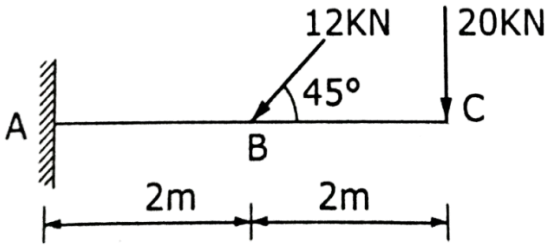


Fig.12(b)

C. State and prove Lami's Theorem. (10)

**(OR)**

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

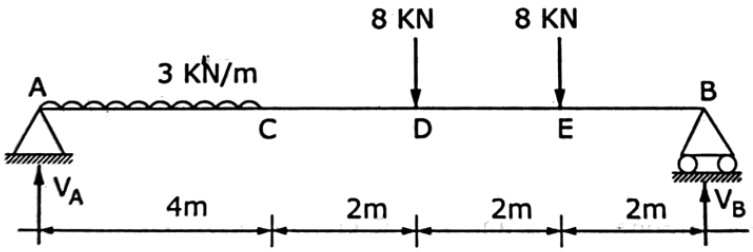


Fig.12(d)

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)

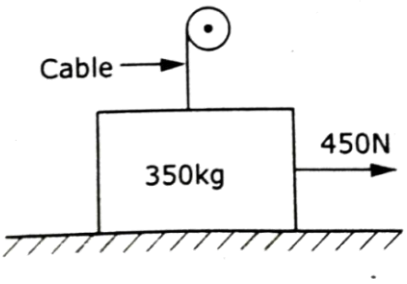


Fig.13(a)

**(OR)**

B. A block of weight 150 N is resting on a rough inclined plane as shown in fig. 13(b). The block is tied up by a horizontal string, which has a tension of 50N. 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)

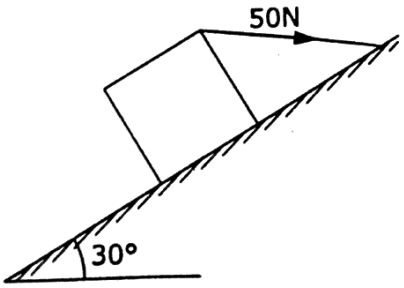


Fig.13(b)

C. Block (2) is rest on block (1) and is attached by a horizontal rope AB to the wall as shown in fig. 13(c). What force P is necessary to cause motion of block (1) to impend? The co-efficient of friction between the blocks is 1/4 and between the floor and block is (1) is 1/3. Mass of blocks (1) and (2) are 14 Kg and 9 Kg respectively. (10)

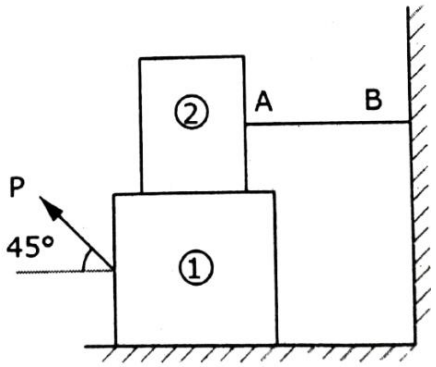


Fig.13(c)

**(OR)**

D. A block of weight 400N is resting on a rough inclined plane as shown Fig.13(d). Find (10)

i) frictional force, ii) Normal reaction and iii) Co-efficient of friction.

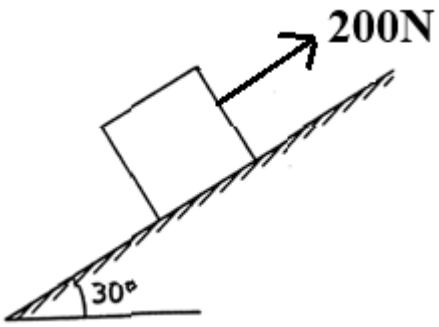


Fig.13(d).

14. A. Locate the centroid of the T – section shown in fig. 14(a). (6)

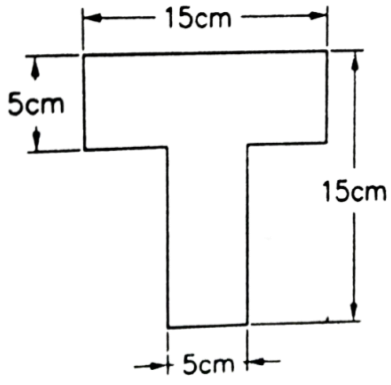


Fig.14(a)

**(OR)**

B. A cylinder of height 10 cm and radius of base 4 cm is placed under sphere of radius 4 cm such that they have a common vertical axis. If both of them are made of the same material, locate the centre of gravity of the combined unit as show in fig. 14(b). (6)

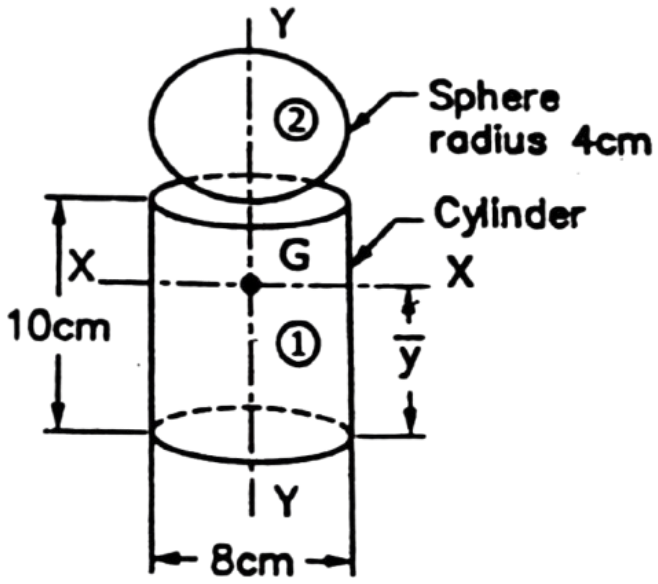


Fig.14(b)

C. Find the centroid of unequal channel section as shown in fig. 14(c). (10)

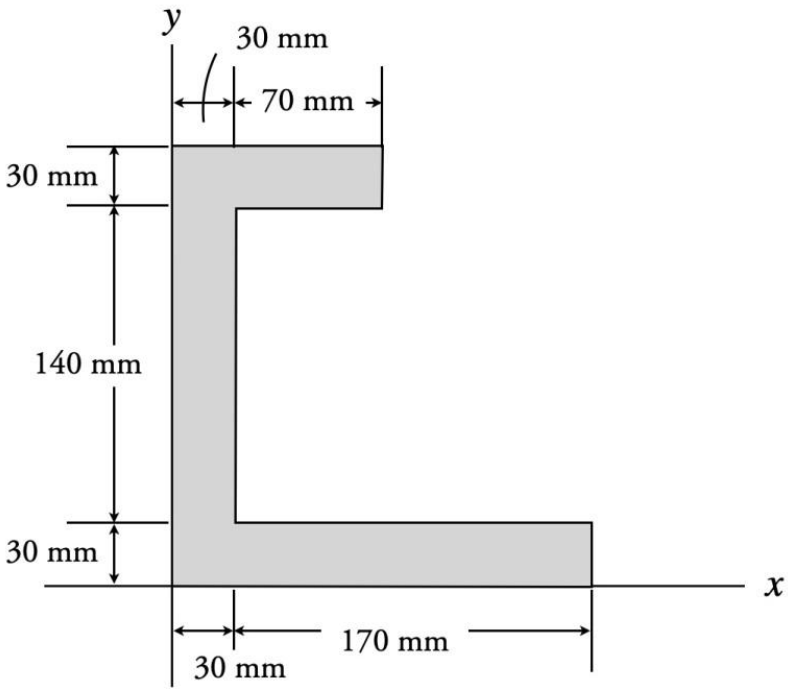


Fig.14(c)

**(OR)**

D. Locate the centroid of the shaded area as shown in fig.14 (d). (10)
(semi-circle diameter is 8 cm)

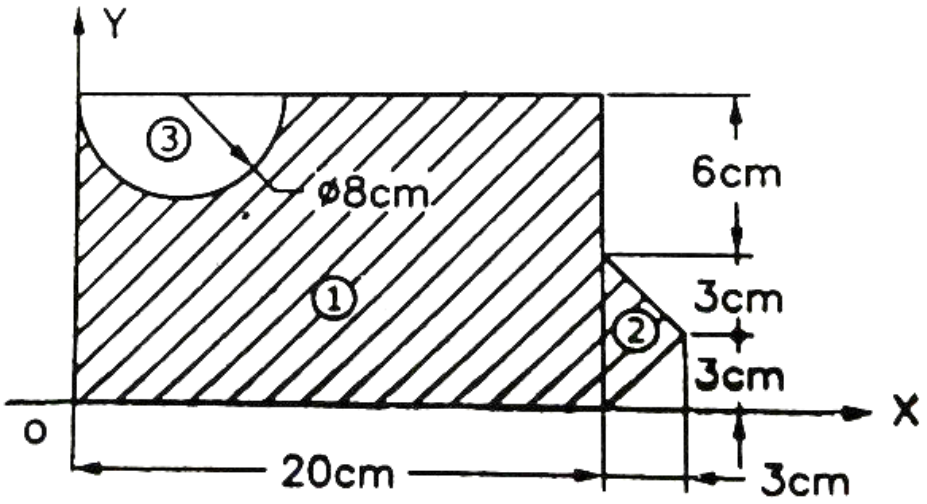


Fig.14(d)

15. A. In a differential wheel and axle, the diameter of the effort wheel is 400 mm. The radii of the axles are 150 mm and 100 mm respectively. The diameter of the rope is 10 mm. Find the load which can be lifted by an effort of 25 N assuming the efficiency of the machine to be 84%. (6)

**(OR)**

B. A worm and worm wheel with 40 teeth on the worm wheel has effort wheel of 300 mm diameter and load drum of 100 mm diameter. Find the efficiency of the machine, if it can lift a load of 1800 N with an effort of 24 N. (6)

C. In a lifting machine, an effort of 500 N is to be moved by a distance of 20 m to raise a load of 10,000 N by a distance of 0.8 m. Determine the velocity ratio, mechanical advantage, efficiency, ideal effort and effort loss due to friction. (10)

**(OR)**

D. Describe simple screw jack with M.A, V.R and efficiency. (10)

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**Registration Number** | | | | | | | | |

# 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

**April/ May - 2026 Semester Examination**

(Regulation-2025)

Semester : **II** Time:3 Hours

Course Code & Title : **25HTPC101 Basics of Handloom & Textiles** Max Marks: 100

## PART-A (10×2=20 Marks)

**Answer all the questions within two to three sentences**

1. Define staple fibre and filament.
2. What do you mean by POY and FDY?
3. Write the main objective of ginning.
4. What is TPI & TM?
5. What are the objectives of warping?
6. What is the purpose of a shuttle in a loom?
7. Classify the types of fabrics.
8. List any two types of twill weave.
9. What is singeing?
10. What is shade percentage?

## PART-B (6+10)×5= 80 Marks

**Answer all the questions in detail**

11. A. Draw a chart for Classification of textile fibres. (6)

**(OR)**

B. Write the chemical compositions of Cotton, Silk and Wool fibres. (6)

C. Write the essential and desirable properties of textile fibres. (10)

**(OR)**

D. Explain melt spinning process with a neat diagram and discuss its merits and demerits. (10)

12. A. Explain the construction and characteristics of single, ply and cabled yarn (6)

**(OR)**

B. Explain the different yarn packages used in the textile industry. (6)

C. Write the sequence of carded & combed yarn manufacturing process with flow chart. (10)

**(OR)**

D. Explain the yarn count systems with examples. (10)

13. A. Draw the chart for Classification of looms and give the definition for each main class. (6)

**(OR)**

B. Briefly explain the motions used in weaving looms. (6)

C. Explain the Passage of warp on the handloom with neat sketch and mention the parts of the loom. (10)

**(OR)**

D. Explain the different parts of a handloom with their functions. (10)

14. A. Describe the principle of woven fabric formation. (6)

**(OR)**

B. Explain the count of graph paper with examples (8×8, 10x10 and 12×12). (6)

C. Explain in detail the principle of design, draft, peg plan, and tie-up plan in weaving. (10)

**(OR)**

D. Explain the construction of 5-thread regular sateen & Satin weave design, draft, peg plan and tie-up (10)

15. A. List out the objectives of desizing, scouring and bleaching. (6)

**(OR)**

B. Write the differences between dyeing and printing. (6)

C. Explain in detail the wet process sequences for cotton fabrics. (10)

**(OR)**

D. Define and classify the dyes & finishing. (10)

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**Registration Number** | | | | | | | |

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Diploma in Handloom & Textile Technology

**April/ May - 2026 Semester Examination**

(Regulation-2021)

Semester : BRIDGE COURSE Time:3 Hours

Course Code & Title : **BS110 Mathematics** Maximum Marks: 100

## PART-A (10×2=20 Marks)

**Answer all the questions within two to three sentences**

1. Without using tables find the value of $\cos 15^0$
2. Convert $\frac{\pi}{5}$ radians into degrees
3. Find the slope of the straight line passing through the points (5,7) and (7,5)
4. Find the equation of the circle with Centre (1,1) and radius $\sqrt{2}$
5. Find the value of $15_{C_{13}}$
6. Find Number of different ways of arrangement using the letters of the word "RAMANUJAN"
7. Define Probability of an Event
8. If P (A)=2/3, P (B)=2/5, P (AUB)=1/3 find P ( $A \cap B$ )
9. Find the mean value of 120, 127, 152, 157, 160, 134, 137, 123, 140, 144.
10. Find the $\overline{R}$ for the range values 2.1, 3.1, 2.1, 1.9, 3.0, 2.5, 2.8, 2.5, 2.0, 3.9

## PART-B ((6+10) ×5=80 Marks)

**Answer all the questions in detail**

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

B. Find the value of $\sin 20^0 \sin 40^0 \sin 60^0 \sin 80^0 = \frac{3}{16}$ by using trigonometric formula (10)

**(OR)**

C. If $A+B=45^0$ Prove that $(1+\tan A)(1+\tan B)=2$ (6)

D. Prove that $\cos 3x = 4\cos^3 x - 3\cos x$ (10)

12. A. Find the equation of a parallel line and a perpendicular line passing through the point (1,2) to the line $3x+4y=7$ (6)

B. Find the eccentricity Centre, foci and vertices of the hyperbola $\frac{x^2}{4}-\frac{y^2}{5}=1$ and also trace the curve (10)

**(OR)**

C. Find the value of 'x' if $A(0,\frac{-3}{2})B(x,-1)$ and $C(2,\frac{-1}{2})$ are collinear (6)

D. If (4,1) is one extremity of a diameter of the circle $x^2+y^2-2x+6y-15=0$ find the other extremity (10)

13. A. If $n_{C_4}=495$ find the value of 'n' (6)

B. Find the general term in the expansion of $(x+\frac{1}{x})^{10}$ (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 expansions of $(2x-\frac{x^2}{4})^{16}$ (10)

14. A. A bag contains 7 white ,6 red 5 black balls Two balls are drawn at random find the probability that they will both be white (6)

B. A box contains 2000 component of which 5 percentage are defective a second box contains 500 components of which 40 percentage are defective (10)

i) What is the probability that the component is defective

ii) If a component is selected is defective what is the probability if from box two

**(OR)**

C. A die is rolled and a coin is tossed simultaneously find the probability that the die shows an odd number and the coin shows head (6)

D. Two dice are rolled find the probability that sum of outcomes is (10)

i) Equal to 4, ii) greater than 10, iii) less than 13

15. A. Define variable data and attribute data with examples (6)

B. Draw the $\overline{X}$ control chart for the following data and state your conclusion (10)

| Sample No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| $\overline{X}$ (Mean) | 37.5 | 49.5 | 51.5 | 59.2 | 54.7 | 34.7 | 51.4 | 61.4 | 70.4 | 75.3 |
| R (Range) | 9.5 | 12.8 | 10.0 | 9.1 | 7.8 | 5.8 | 14.5 | 2.8 | 3.7 | 8.0 |

Given that: sample size =6, $A_2 = 0.483$

**(OR)**

C. In a factory 1000 belts are examined daily for defectiveness the number of defectives in 10 days are 9,10,12,8,7,15,10,12,10 and 8 calculate the control limit values for np-chart (6)

D. Construct a control chart for defectives for the following data (10)

| Sample NO | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. of inspected | 90 | 65 | 85 | 70 | 80 | 80 | 70 | 95 | 90 | 75 |
| NO. of defectives | 9 | 7 | 3 | 2 | 9 | 5 | 3 | 9 | 6 | 7 |

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**Table : Quality Control - Chart Constants**

| Sample Size | Chart for average $\bar{X}$-chart | | | $\sigma$-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 | 7.8407 | 0 | 1.756 | 0 | 2.089 | 2.326 | 0 | 4.918 | 0 | 2.115 |
| 6 | 1.225 | 1.410 | 0.483 | 0.8686 | 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 | 1534 | 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 |