

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

APR/MAY-2025 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. Find x if $\begin{vmatrix} 2 & 4 \\ -1 & x \end{vmatrix} = 0$.
2. If $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}$ find $(A + B)^T$.
3. Evaluate $\int e^{-3x} dx$.
4. Evaluate $\int \sec x (\sec x - \tan x) dx$.
5. Find the centre and radius of the circle $x^2 + y^2 = 4$.
6. If the distance between the points (3,a) and (6,1) is 5 then find the value of a.
7. Find the modulus of the vector $\vec{i} + 5\vec{j} - 7\vec{k}$.
8. Find the sum of the two vectors $\vec{a} - 2\vec{b} + 3\vec{c}$ and $-2\vec{a} + 3\vec{b} - \vec{c}$.
9. Define Type I and Type II error?
10. A normal population has a mean of 6.48 and SD of 1.5. In a sample of 400 members is 6.75. Is the difference significant?

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. If $A = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 1 & 0 \\ 0 & 3 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 & 3 \\ 2 & 1 & 1 \\ 1 & 0 & 2 \end{bmatrix}$, show that $AB \neq BA$. (6)
B. By using Cramer's rule, solve the equations (10)
 $x + y + z = 3$, $2x - y + z = 2$ and $3x + 2y - 2z = 3$.
(OR)
C. If $A = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$. Verify $(AB)^T = A^T B^T$. (6)

D. Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ (10)

12. A. Evaluate $\int (x^2 + x - 1)(x^2 - x + 1)dx$. (6)

B. Evaluate $\int \frac{x+1}{(x+3)(x+2)} dx$. (10)

(OR)

C. Evaluate $\int x e^{5x} dx$. (6)

D. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$. (10)

13. A. Find the value of 'k' so that the equation (6)

$2x^2 + 7xy + 6y^2 + 9x + 13y + k = 0$ represents pair of straight lines.

B. Show that the circles $x^2 + y^2 - 4x + 6y + 8 = 0$ and (10)

$x^2 + y^2 - 10x - 6y + 14 = 0$ touch other. Find also the point of contact.

(OR)

C. Prove that the points A(2,0), B(11,6) and C(-4,4) are collinear. (6)

D. Find the equation of parabola whose focus is (-1,-2) and directrix is (10)
 $x - 2y + 3 = 0$.

14. A. Show that the vectors $\vec{i} - 3\vec{j} + 5\vec{k}$ and $-2\vec{i} + 6\vec{j} + 4\vec{k}$ are mutually (6)
perpendicular.

B. Show that the points whose position vectors $4\vec{i} + 2\vec{j} + 3\vec{k}$, $2\vec{i} + 3\vec{j} + 4\vec{k}$ and (10)
 $3\vec{i} + 4\vec{j} + 2\vec{k}$ form an equilateral triangle.

(OR)

C. Find the work done by the force $2\vec{i} + \vec{j} + \vec{k}$ acting on the particle, if the (6)
particle is displaced from $4\vec{i} + \vec{j} + 3\vec{k}$ to the point $5\vec{i} + 4\vec{j} + 2\vec{k}$.

D. Find the magnitude of torque about the point (4, 3,-1) of the force represented (10)
by $6\vec{i} + \vec{j} - \vec{k}$ acting through the point (0, 1, -1).

15. A. A sample of 900 members has a mean 3.4 cm and standard deviation 2.61cm. (6)

Is the sample from a large population of mean 3.25 cms and standard deviation of 2.61 cms? (Test at 5% level of significance. The value of z at 5% level is $(|z_\alpha| < 1.96)$)

B. A group of 10 rats fed on diet A and another group of 8 rats fed on diet B, (10)

recorded the following increase in weight (gms)

Diet A: 5,6,8,1,12,4,3,9,6,10

Diet B: 2,3,6,8,10,1,2,8

Find if the variances are significantly different.

(OR)

- C. Given a sample mean of 83, a sample standard deviation of 12.5 and a sample size of 22, test the hypothesis that the value of the population mean is 70 against the alternative that it is more than 70. (6)

- D. A company keeps records of accidents. During a recent safety review, a random sample of 60 accidents was selected and classified by the day of the week on which they occurred. (10)

Day:	Mon	Tue	Wed	Thu	Fri
No. of accidents:	8	12	9	14	17

Test whether there is any evidence that accidents are more likely on some days than others.

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Diploma in Handloom & Textile Technology

APR/MAY-2025 SEMESTER EXAMINATION

(Regulation-2021)

Semester : II

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 are the Derived Quantities?
2. What is the unit of energy in CGS and SI system?
3. Define viscosity.
4. State Hooke's law.
5. Write the difference between heat and temperature.
6. Define expansion of gases.
7. Define critical angle.
8. Write laws of refraction.
9. State Kirchhoff's law.
10. Draw the circuit symbols for p-n-p and n-p-n transistors.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. Find the dimensional formulae of the following physical quantities (6)
i) Force ii) Young's Modulus iii) Universal gravitational constant (G)
B. Check the dimensional analysis whether the given equation is correct or not: (10)
 $v^2 = u^2 + 2as$ where 'v' is the final velocity, 'u' is the initial velocity 'a' is the acceleration and 's' is the displacement.
(OR)
C. Define significant figure. Write rules for determining significant figures in a number. (6)
D. What are errors? Explain the different types of errors in measurement with suitable examples. (10)
12. A. State the Stokes's law. Write down its derivation. (6)

B. Explain the stress- strain curve and its significance. (10)

(OR)

C. Find the moment of inertia of a hollow sphere of mass 21 kg and radius 9 meter rotating about an axis passing through its centre and perpendicular to its plane. (6)

D. Define Friction. Explain different types of Friction in details. (10)

13. A. A scientist measures the temperature of a gas as 315 K. Using this information (i) Convert the temperature to Celsius and Fahrenheit (ii) If the gas is cooled down to 77°F, what will be its temperature in Kelvin and Celsius? In this problem identify heat transfer mode. (6)

B. Explain various modes of heat transfer with examples. (10)

(OR)

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

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

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

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

(OR)

C. What is a simple microscope? Give its four uses. (6)

D. What are vibrations? What are the free, damped and forced vibrations? Give examples for each. (10)

15. A. Derive the equation for Kirchhoff's voltage law. (6)

B. Derive the equation for equivalent capacitance, when the capacitors are connected in series and parallel. (10)

(OR)

C. Discuss about extrinsic semiconductors with suitable examples. (6)

D. Describe the working of P-N-P transistor with neat diagram. (10)

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Venkatagiri/KLB-Hyderabad

Diploma in Handloom & Textile Technology

APR/MAY-2025 SEMESTER EXAMINATION

(Regulation-2021)

Semester : II

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 table tag.
2. What is Web Browser?
3. Write the full form of HTML, CSS, CLI, and GUI.
4. What is Search Engine?
5. Who developed C programming language and in which year?
6. Write four examples of operating system.
7. How RAM is different from ROM.
8. Define Input Device.
9. What is spreadsheet?
10. Write the uses of Microsoft Word.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. Explain Memory. How primary memory is different from secondary memory? (6)
B. What is computer? Write the characteristics of computer and also draw and mention the name of the different components of computer. (10)
- (OR)
- C. Describe internet and intranet? Differentiate between software and hardware. (6)
D. What is web browser? How search engine is different from web browser? (10)

12. A. Explain operating system and also discuss its function and services. (6)
B. Define UNIX operating system. How LINUX is different from UNIX. (10)

(OR)

- C. Explain Shell and also discuss its types. (6)
D. What are UNIX commands? Write six UNIX commands with description. (10)

13. A. Explain heading tag, image tag and style tag. Write a HTML document using these tags. (6)
B. What is CSS? Why we use CSS in HTML document? Write the benefits of using CSS in HTML document. (10)

(OR)

- C. Describe HTML with example. Discuss its features. (6)
D. How we add CSS in HTML page discuss its type with example. (10)

14. A. Explain Microsoft excel and Microsoft power point presentation and also mention its applications. (6)
B. What is Microsoft word? Design and prepare a resume. (10)

(OR)

- C. How Open Office is different from MS-office? (6)
D. Explain Software and its type. (10)

15. A. What is keyword in C language? Write the evolution/history of C language. (6)
B. Discuss data type in C programming language. Write a program in C language to check whether a given number is even or odd. (10)

(OR)

- C. Define High Level Language? Write a program in C language to add two integer values. (6)
D. Describe conditional statements in C language. (10)

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APR/MAY-2025 SEMESTER EXAMINATION

(Regulation-2021)

Semester : **II**

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 passive and active components.
2. Draw a NOR gate functional block diagram and write its truth table.
3. Define slew rate and CMRR.
4. Define the open loop differential voltage gain of OP-AMP.
5. State Faraday's law.
6. Define magnetic flux density.
7. Define power factor and form factor.
8. Draw a phasor diagram of the R-C circuit.
9. What are step-up and step-down transformers?
10. What is a slip? Write the expression for rotor frequency in terms of supply frequency.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail.

11. A. Define the AND, OR & NOT gates with symbols and truth tables. (6)
B. Explain the construction and working principle of the diode. Also, draw the I-V characteristics of the diode. (10)

(OR)

- C. Write short notes on Half adder and Full adder. (6)
D. Construct the state table and explain the operation of the S-R flip flop. (10)
12. A. An inverting amplifier has $R_1=10K\Omega$, $R_f=30\Omega$, and an input voltage of 10V. (6)

Determine its voltage gain and output voltage.

- B. Draw the circuit diagram and explain the integrator circuit. Also, derive the expression for the output voltage. (10)

(OR)

- C. Draw and explain the block diagram of the OP-AMP. (6)
D. What is OP-AMP? Write the characteristics of an ideal OP-AMP. (10)

13. A. Define EMF, magnetic force and Lenz's law. (6)
B. Explain the statically and dynamically induced EMF. (10)

(OR)

- C. Compare magnetic circuits and electric circuits. (6)
D. Draw and explain the Hysteresis loop. (10)

14. A. Describe a cycle, time period, and frequency. (6)
B. Give the phasor representation of the R-L series circuit and derive the power and power factor expression. (10)

(OR)

- C. Derive the expression for the RMS value and the average value of an alternating quantity. (6)
D. A resistance coil is $4\ \Omega$, and an inductance of 0.08H is connected in series with a capacitor $8\ \mu\text{F}$ across 240V , 50Hz supply. Calculate **(i)** Inductive reactance, **(ii)** Capacitive reactance, **(iii)** Impedance, **(iv)** current, **(v)** power factor (10)

15. A. Derive the EMF equation of transformers. (6)
B. Explain the construction and working principle of the transformer with a diagram. Also, write the transformation ratio formula of a transformer. (10)

(OR)

- C. Explain the construction and working of 3-phase induction motors. (6)
D. Explain how DC motors work and their types in detail. (10)

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APRIL/MAY-2025 SEMESTER EXAMINATION

(Regulation-2021)

Semester : II

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 . Define principle of Transmissibility?
- 2 . Two forces are 400N and 600N act 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 loads?
- 5 . Define Angle of friction.
- 6 . Define Angle of repose.
- 7 . What is meant by the Centre of gravity of an object?
- 8 . Find the centroid of quadratic circle of radius is 15 mm.
- 9 . Distinguish between reversible machine and non-reversible machine.
- 10 . The dia of wheel in a differential axle and wheel is 36 cm. The axles are 9 cm and 6 cm diameter. Find its velocity ratio.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. Derive and express of parallelogram law of forces. (6)
- B. The four coplanar forces are acting at a point as shown in fig.11(b). (10)
Determine the resultant in magnitude and direction.

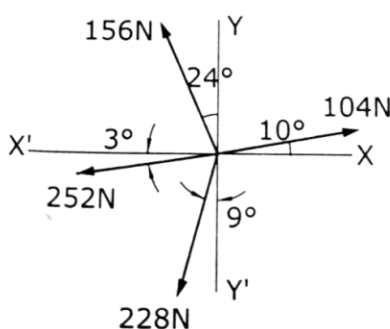


Fig.11(b)

(OR)

- C. If $\vec{P} = 6i + 12j - 5k$ and $\vec{Q} = -3i + 4j - 2k$ find $(\vec{P} \times \vec{Q}) \cdot (\vec{P} \times \vec{Q})$ (6)
- 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 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.

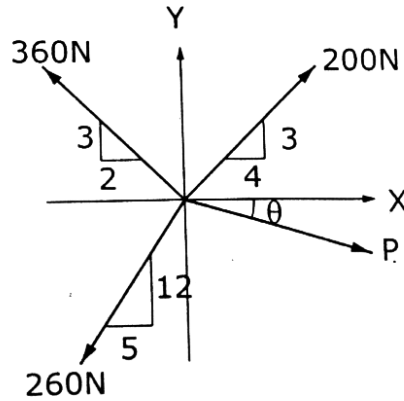


Fig.11(d)

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

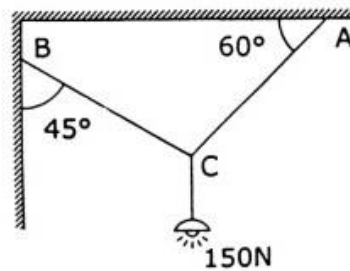


Fig. 12(a)

- B. Two equal weights each of 1000 N is supported by a flexible string as shown in fig.12(b). Find the tension in the portions AB, BC and CD of the string. (10)

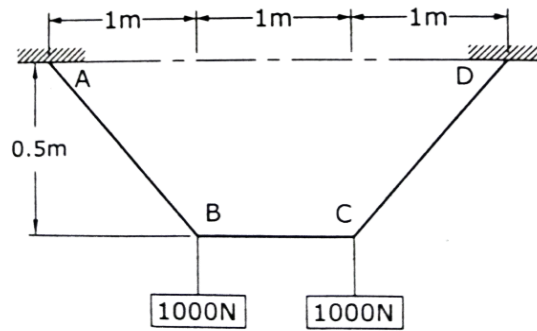


Fig.12(b)

(OR)

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

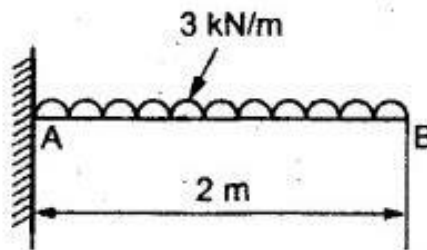


Fig. 12(c)

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

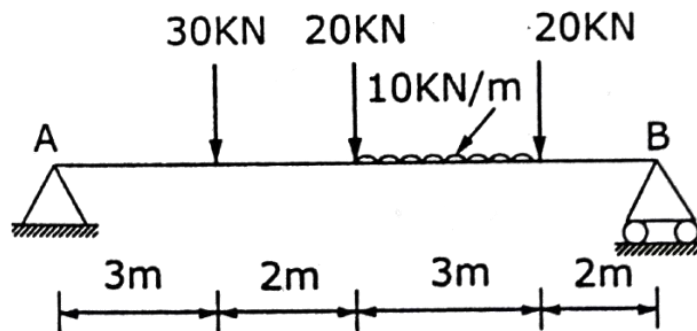


Fig. 12(d)

13. A. A body weight 100 N is placed on a rough horizontal plane, and pushed by a force of 45 N as shown in fig.13(a) to just case sliding over the horizontal plane. Determine the co-efficient of friction. (6)

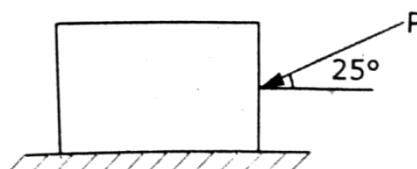


Fig. 13(a)

- 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)

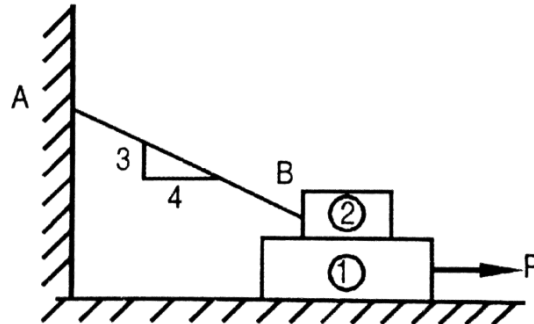


Fig. 13(b)

(OR)

- C. A block 1000 N is on an inclined plane as shown in fig.13(c) below, if the coefficient of friction between surfaces is 0.25 and block is about to move down, then what will be the friction force between the surfaces of block and plane. (6)

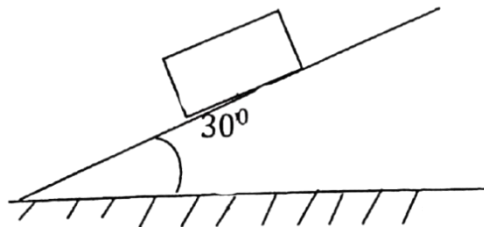


Fig. 13(c)

- D. What should the value of the θ in fig.13(d) below, which will make the motion of 900 N block down the plane to impend? The co-efficient of friction for all contact surfaces is $1/3$. (10)

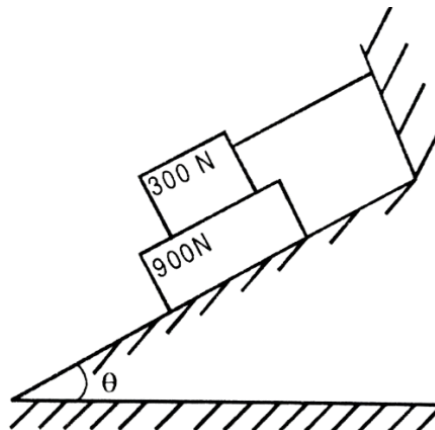


Fig. 13(d)

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

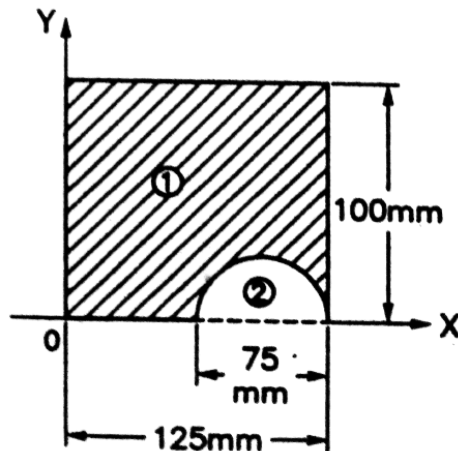


Fig. 14(a)

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

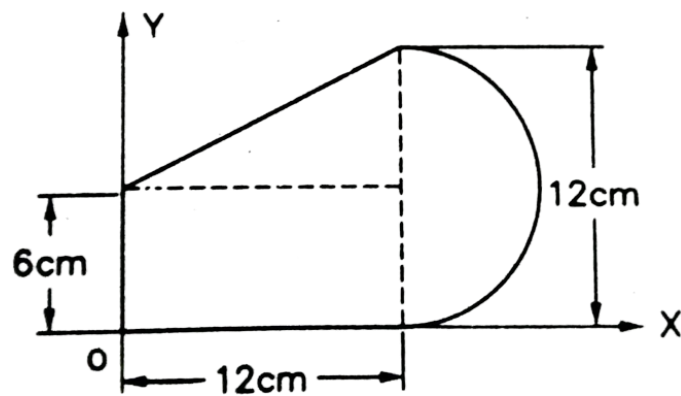


Fig. 14(b)

(OR)

- C. Find the position of the centroid of the solid combination shown in fig.14(c) (6)
consisting of a solid cone of height 50 mm and base diameter 80 mm and a cylinder of height 100 mm and diameter 80 mm with a semicircular cut as shown.

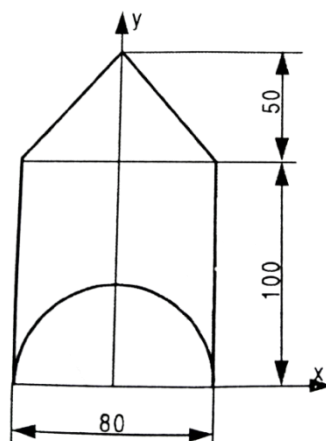


Fig. 14(c)

- D. Determine the centroid of the unsymmetrical I-section shown in fig.14(d). (10)
 (Top flange 100 x 30 mm, bottom flange 200 x 40 mm and web 30 x 100 mm)
 (All dimensions are in mm)

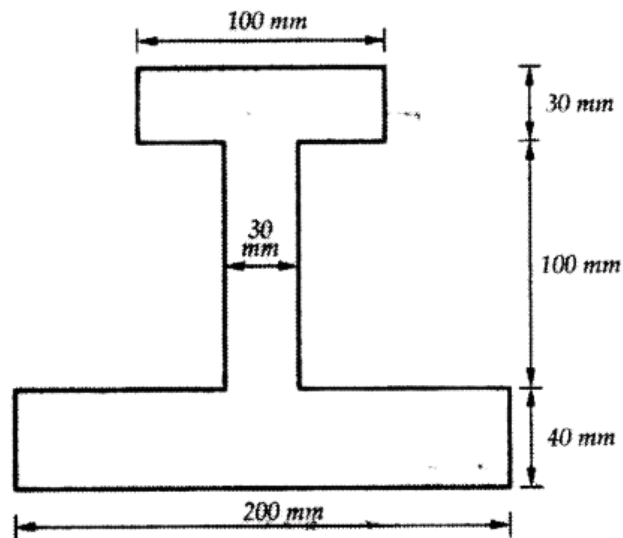


Fig. 14(d)

15. A. In a certain weight lifting machine, a weight of 1000 N is lifted by an effort of 25 N while the weight moves up by 100 mm, the point of application of that effort moves by 8 m. Find Mechanical advantage, velocity ratio and efficiency. (6)
- B. In a lifting machine, an effort of 500 N is to be moved by a resistance of 20m to raise a load of 10,000 N by a distance of 0.8 m. Determine the velocity ratio, mechanical advantage and efficiency of the machine. Determine also ideal effort, Effort loss in friction, ideal load and frictional resistance. (10)

(OR)

- C. A screw jack has a thread of 10 mm pitch. What effort applied at the handle 400 mm long will be required to lift a load of 2 KN, if the efficiency at this load is 45%. (6)
- D. Explain about worm and worm wheel with neat sketch and write the short notes on M.A, V.R and efficiency. (10)
