

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.

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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 : 03/05

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. Find the value of $\cos 45^\circ$
2. Simplify $1 - 2\sin^2 22\frac{1}{2}^\circ$.
3. Find the equation of the circle with centre at origin and radius 10 units.
4. Show that the equation $9x^2 - 12xy + 4y^2 + 2x - y + 1 = 0$ represents a parabola.
5. Find the value of ${}^{10}C_3$.
6. Find the number of ways of arrangement of the letters from the word "TOTAL".
7. A contains 5 blue balls and 4 green balls. A ball is drawn at random. What is the probability to draw a blue ball?
8. Write any two axioms of probability.
9. Find the \bar{R} for the range values 5,6,5,7,7,4,8,6,4,6
10. Write the formula to find the control limits of c-chart.

PART-B

((6+10)×5=80 Marks)

Answer all the questions in detail

11. A. If $\sin A = \frac{3}{4}$ Calculate the value of $\cos A$ and $\tan A$ (6)
B. Prove that $\cos 3A = 4 \cos^3 A - \cos A$ (10)
(OR)
C. Show that $\frac{\sin 3A}{1 + 2\cos 2A} = \sin A$. (6)
D. If $\tan A = \frac{1}{3}$ and $\tan B = \frac{1}{7}$, show that $2A + B = 45^\circ$ (or) $\frac{\pi}{4}$. (10)
12. A. Find the equation of circle which is concentric with the circle (6)
 $x^2 + y^2 - 8x + 12y + 15 = 0$ and passing through the point(5,4).

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

(OR)

- C. Show that the equation $21x^2 - xy - 10y^2 + 5x + 13y - 4 = 0$ represents pair of lines. (6)

- D. Show that the circles $x^2 + y^2 - 4x + 6y + 8 = 0$ and $x^2 + y^2 - 10x - 6y + 14 = 0$ touch each other. Find also the point of contact. (10)

13. A. There are 15 candidates for an examination. 7 candidates are appearing for mathematics examination while the remaining 8 are appearing for different subjects. In how many ways can they be seated in a row so that no two mathematics candidates are together? (6)

- B. Find the middle term in the expansion of $(x^3 + \frac{2}{x^3})^{11}$. (10)

(OR)

- C. Expand $(3x + 5y)^5$. (6)

- D. Find the coefficient of x^{30} in the expansion of $(x^4 + \frac{1}{x^6})^{15}$. (10)

14. A. If $P(A)=1/4$, $P(B)=1/2$ and $P(A \cap B) = 1/8$, find (I) $P(A/B)$ (II) $P(A \cup B)$. (6)

- B. State and prove Baye's theorem. (10)

(OR)

- C. A random variable X has the probability distribution (6)

X	0	1	2	3	4	5	6	7	8
P(X)	k	3k	4k	5k	7k	9k	11k	13k	15k

Find the values of (i) k (ii) $P[X \leq 5]$ (iii) $P[X \geq 4]$.

- D. The contents of urns I, II, III as follows (10)

Urn \ Balls	White	Black	Red
I	1	2	3
II	2	1	1
III	4	5	3

One urn is chosen at random and two balls are drawn that happen to be white and red. What is the probability that they come from urns I, II and III ?

15. A. Explain about control chart with type. (6)
- B. The following are the sample means and ranges for ten samples, each of size (10)
5. Construct the control chart for mean and comment on the nature of control.

Sample No:	1	2	3	4	5	6	7	8	9	10
Mean	12.8	13.1	13.5	12.9	13.2	14.1	12.1	15.5	13.9	14.2
Range:	2.1	3.1	3.9	2.1	1.9	3.0	2.5	2.8	2.5	2.0

(OR)

- C. A textile unit produces special cloths and packs them in rolls. The numbers of defects found in 20 rolls are given below. Find whether the process is under control. (6)
- Defects in 20 rolls: 12,14,7,6,10,10,10,11,12,5,18,12,4,4,9,21,14,8,9,13,21.
- D. Construct a control chart for defectives for the following data (10)

Sample no	1	2	3	4	5	6	7	8	9	10
Mean	37.3	49.8	51.5	59.2	54.7	34.7	51.4	61.4	70.7	75.3
Range:	9.5	12.8	10.0	9.1	7.8	5.8	14.5	2.8	3.7	8.0

$A_2 = 0.483$, $D_3 = 0$ & $D_4 = 2.004$.

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	4.898	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	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

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)

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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)

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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 60^0 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.

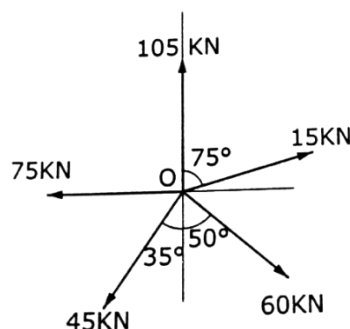


Fig.11(b)

(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.

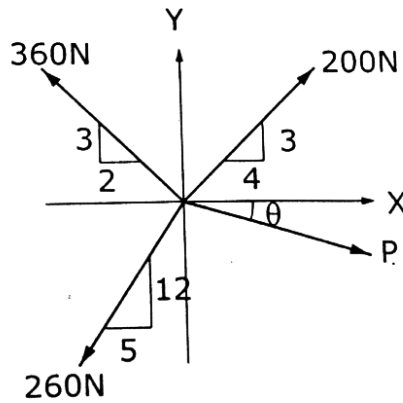


Fig.11(d)

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

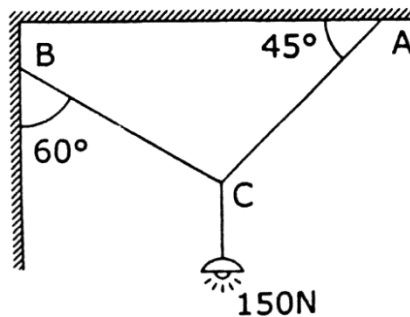


Fig. 12(a)

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

(OR)

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

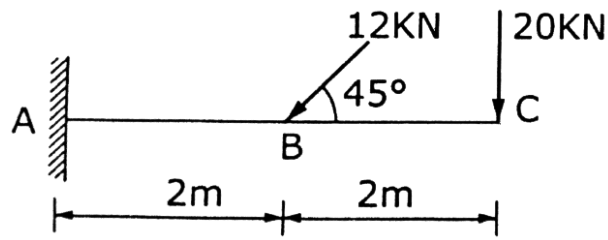


Fig. 12(c)

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

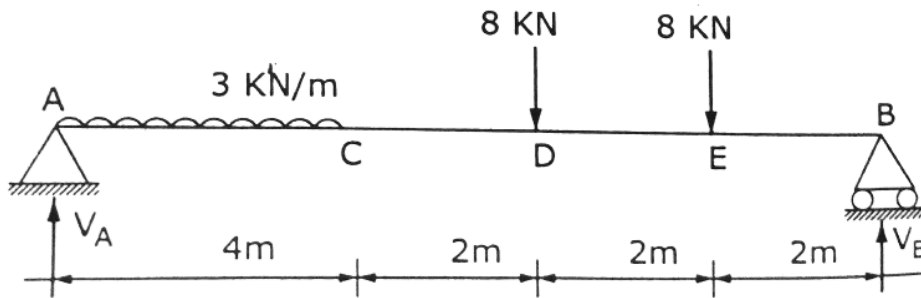


Fig. 12(d)

13. A. A 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)

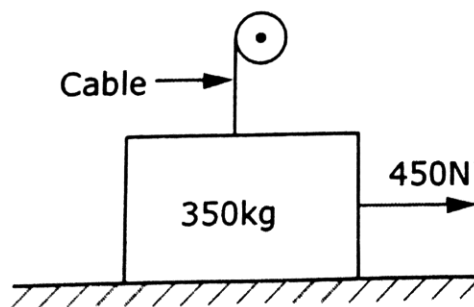


Fig. 13(a)

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)

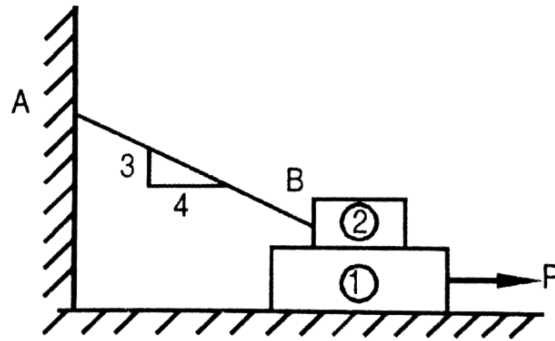


Fig. 13(b)

(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)

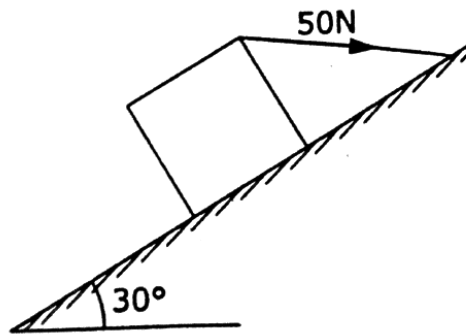


Fig. 13(c)

- 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)

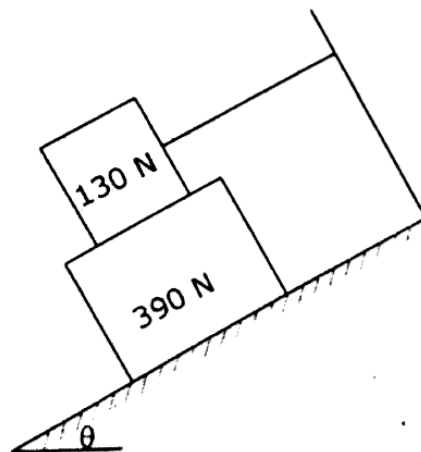


Fig. 13(d)

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

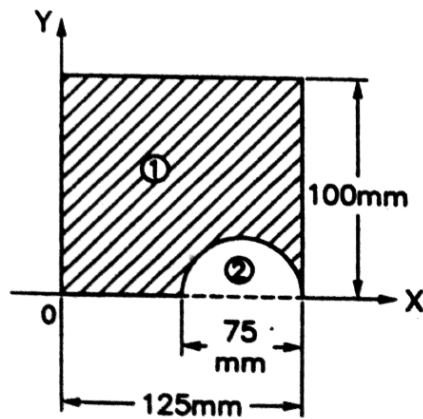


Fig. 14(a)

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

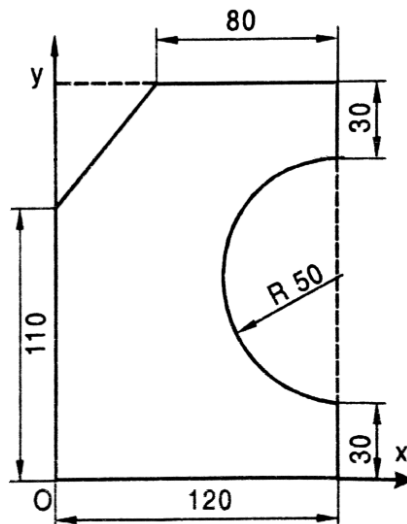


Fig. 14(b)

(OR)

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

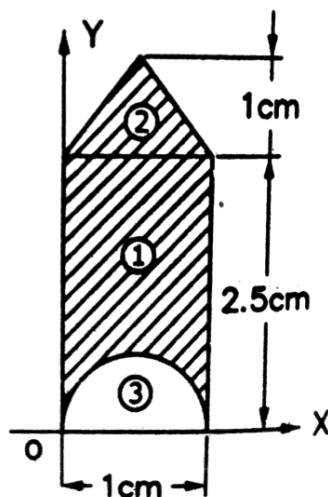


Fig. 14(c)

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

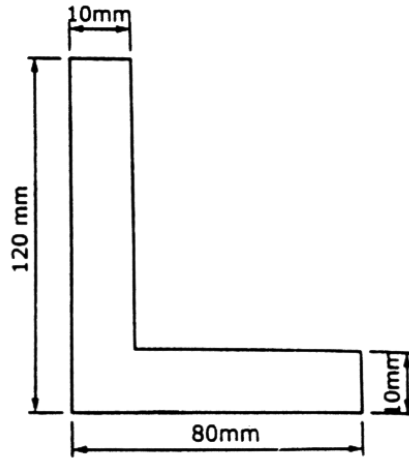


Fig. 14(d)

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)
