

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

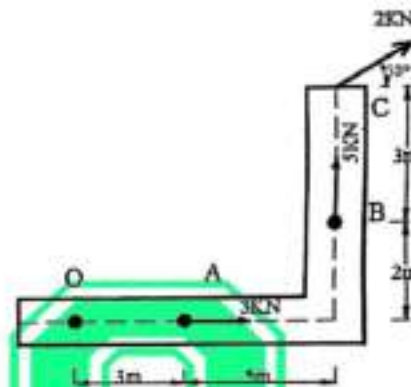
Attempt any **FIVE** questions.



www.arjun00.com.np

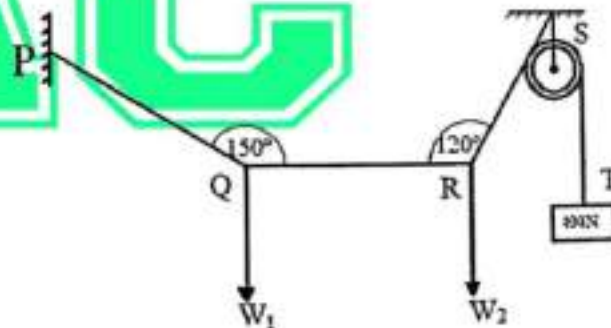
1. a. Enlist the scope of applied mechanics. Also differentiate [3+3]
between rigid and deformed body.

- b. Find the moment at point 'O'. [6]



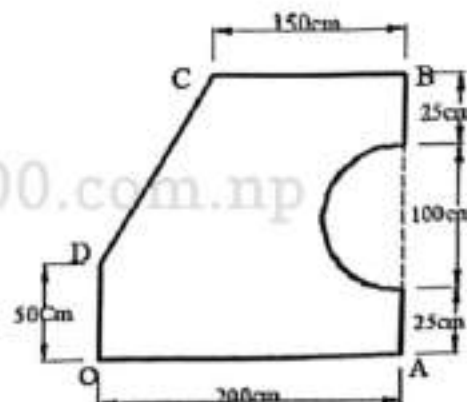
2. a. State and prove parallelogram laws of force. [6]

- b. Determine value of forces in RQ, PQ, W_2 and W_1 of following given network connection of string. [6]



3. a. Define friction. Write down the laws of friction. [2+4]

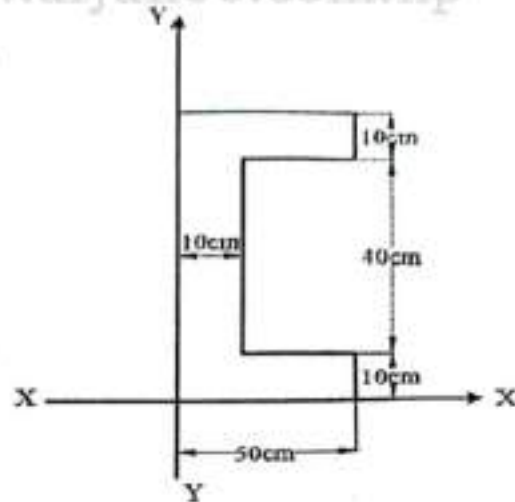
- b. Locate the centroid of the given composite area. [6]



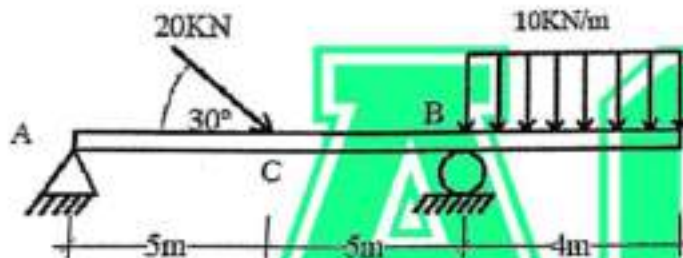
www.arjun00.com.np

Cont.

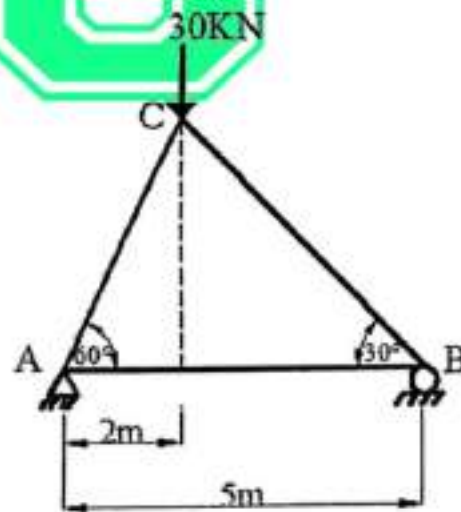
4. a. Enlist different types of loads in beam structure. Also, describe the application of moment of inertia in engineering problems. [3+3]
- b. Determine moment of inertia about X-X and Y-Y axis. [6]



5. a. Draw SFD and BMD of the following loaded beam. [6]



- b. Calculate reaction forces and forces on member AC and AB of given truss. [6]



6. Write short notes on: (any **THREE**) [3×4]
- Types of beam
 - Parallel axis theorem
 - Free body diagram
 - Bow's notation

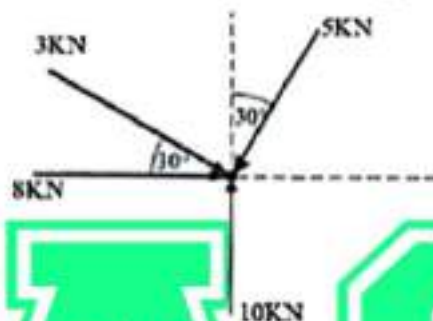
Good Luck !



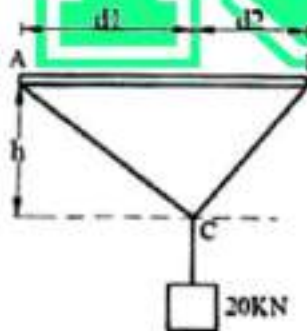
Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt any **FIVE** questions.

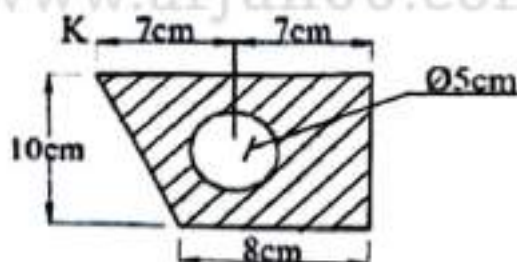
1. a. Define particle, rigid body and deformable body. [6]
- b. Find the resultant of the following force system: [6]



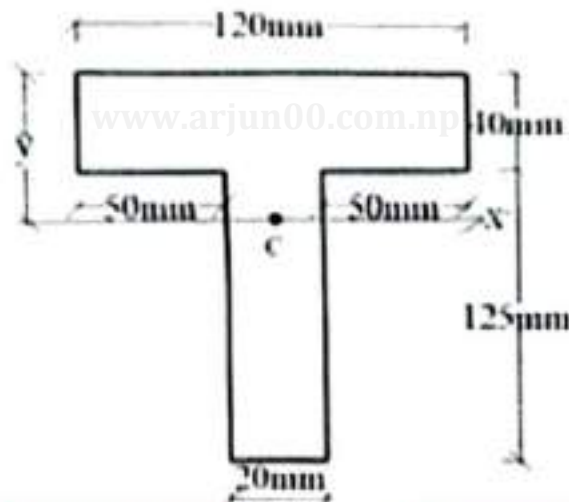
2. a. State and prove Lami's theorem. [6]
- b. Find the tensions in the cables AC and BC which are supporting a load of 20 kN. Given that: $h=1$ m, $d_1=4.5$ m and $d_2=3.25$ m. [6]



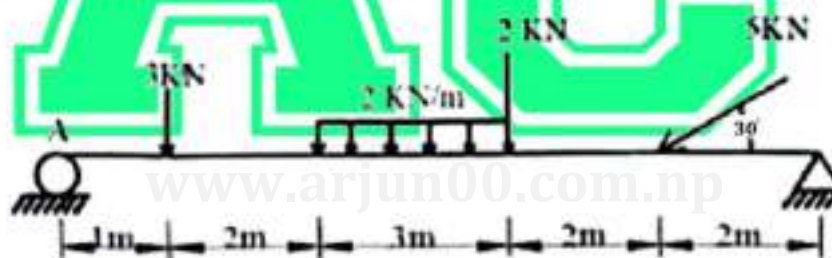
3. a. Determine the coordinates of the centroid of the given composite figure. The circular hole has a diameter of 5 cm. [6]



- b. Determine the location \bar{y} of the centroid C of the beam's cross sectional area. Then compute the moment of inertia for the area about the centroidal x -axis. [6]



4. a. State and prove parallel and perpendicular axis theorem. [6]
b. Define beam. Discuss different types of beam. [2+4]
5. a. Draw shear force diagram and bending moment diagram of the following loaded beam: [6]



- b. Define truss. Discuss different types of truss on the basis of their use. [2+4]
6. Write short notes on: (any **THREE**) [3×4]
- a. Types of support in structure
 - b. Uniformly distributed load and uniformly varying load
 - c. Center of gravity and center of mass
 - d. Polygon law of forces

Good Luck !



www.arjun00.com.np

AC



Back/Scholarship Exam – 2081/2082 Chaitra/Baishakh
Program: Diploma in Civil/Hydropower Engg.

Full Marks: 80

Year/Part: II/I (2013, 2017) © Arjun

Pass Marks: 32

Subject: Applied Mechanics

Time: 3 hrs.

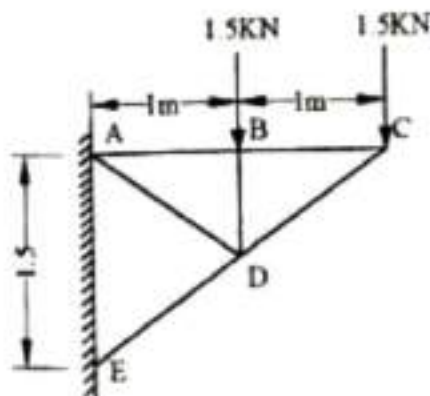
Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks



www.arjun00.com.np

Attempt any **FIVE** questions.

1. a. Define rigid body, deformable body. State Lami's theorem of three coplanar forces. Write down the equations of static equilibrium. [6]
- b. The following forces act a point: [10]
 - i. 20 N inclined at 30° towards North of East
 - ii. 25 N towards north
 - iii. 30 N towards west
 - iv. 35 N inclined at 40° towards south of westFind the magnitude and direction of resultant forces.
2. a. Define axial force, shear force and bending moment with diagrams. What are the different types of loads acting in a structure? Write down the different types of support with figures and its degree of freedom. [3+2+3]
- b. Determine the forces in each member of truss as shown in figure. Tabulate the results stating whether they are in tension or compression. [8]

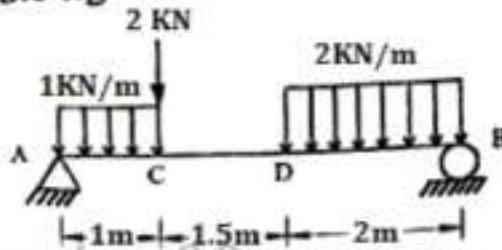


1. a. Define friction, Centre of gravity, moment of inertia, couple, radius of gyration and angle of friction. [6]

www.arjun00.com.np

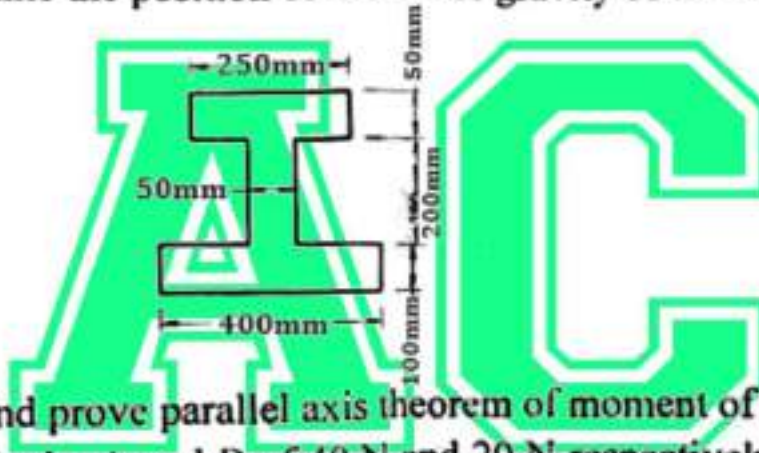
Cont.

- b. Draw the shear force and bending moment diagram for the beam loaded as shown in the figure. [10]

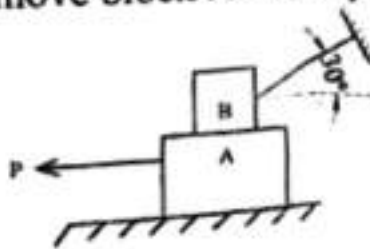


4. a. Prove that the Mol of triangular section about an axis through its centroid and parallel to its base is $\frac{bh^3}{36}$. Where, h = height of triangular section and b = base of triangular section. [6]

- b. An I section has the following dimensions in mm units. Determine the position of Centre of gravity of the section. [10]



5. a. State and prove parallel axis theorem of moment of inertia. [6]
b. Two blocks A and B of 40 N and 20 N respectively are in equilibrium position as shown in figure. Calculate the force P required to move block A. Take $\mu = 0.3$ for all surfaces. [10]



6. Write short notes on: (any **FOUR**)

- | | |
|--|-------------------------------|
| a. Laws of friction | b. Triangle law of forces |
| c. Principle of transmissibility | d. Truss and its types |
| e. Different types of beams with diagram | f. Perpendicular axis theorem |

Good Luck !





Council for Technical Education and Vocational Training
Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Scholarship/Back Exam – 2081 Bhadra/Ashwin

Program: Diploma in Engineering All

Full Marks: 60

Year/Part: I/II (2021) © Arjun

Pass Marks: 24

Subject: Applied Mechanics

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks



www.arjun00.com.np

Attempt any **FIVE** questions.

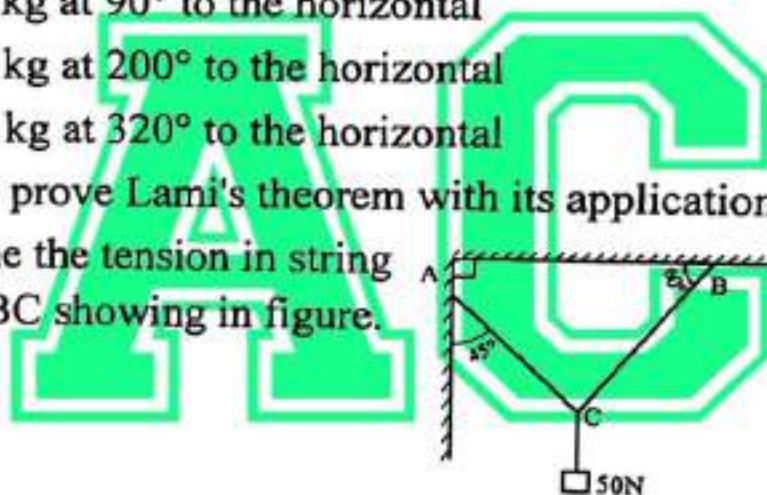
1. a. Define mechanics and scope of applied mechanics. [3+3]
Explain the terms particle, rigid body and deformable body.

- b. The following forces act at a point. Find the magnitude and direction of resultant force: [6]

- 15 kg at 45° to the horizontal
- 10 kg at 90° to the horizontal
- 47 kg at 200° to the horizontal
- 45 kg at 320° to the horizontal

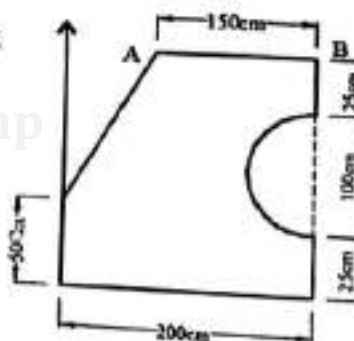
2. a. State and prove Lami's theorem with its application. [1+5]

- b. Determine the tension in string AC and BC showing in figure. [6]



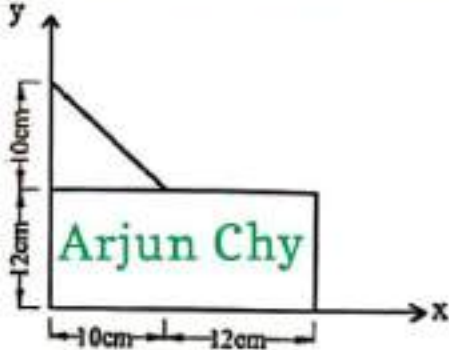
3. a. Define friction with its causes. A mass of 60 kg is pulled up on a rough inclined plane whose inclination to horizontal plane is 35° by a force of 35 kg acting parallel to the plane. Find the coefficient of friction. [2+4]

- b. Locate the centroid of the given composite area. [2+4]

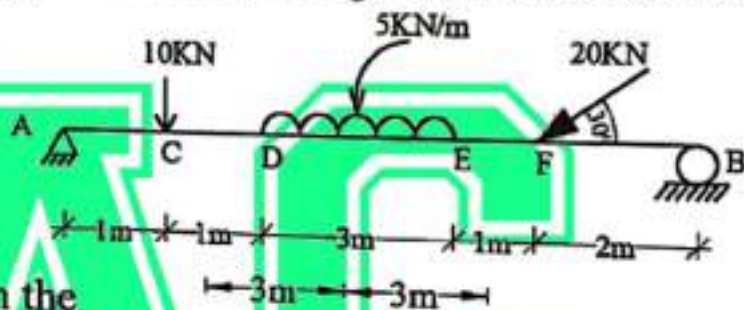


Cont.

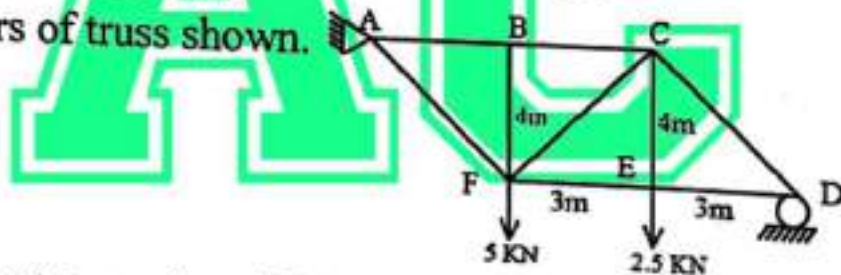
4. a. Define axial and polar moment of inertia. State and prove the parallel axis theorem for moment of inertia. [2+6]
- b. Find the moment of inertia about centroid of given figure. [6]
X-axis is parallel to the base.



5. a. Determine the support reactions of given loaded beam as shown in figure. [8]



- b. Find the forces in the members of truss shown. [6]



6. Write short notes on: (any **FOUR**) [4×3]
- Coplanar and concurrent forces
 - Equation of static equilibrium
 - Sliding and tipping condition of body
 - Different types of load and supports
 - Axial force, shear force and bending moment

Good Luck !





Program: Engineering ALL

Full Marks: 60

Year/Part: I/II (2021)

© Arjun

Pass Marks: 24

Subject: Applied Mechanics

Time: 3 hrs.

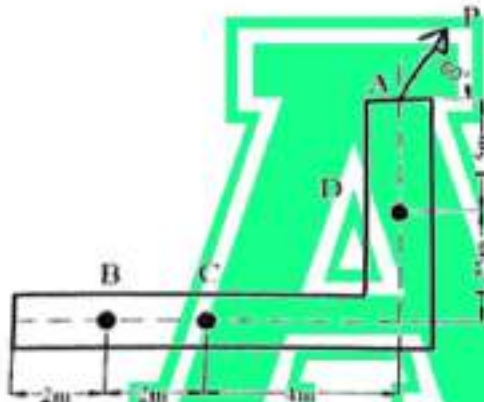
Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt any **FIVE** questions.

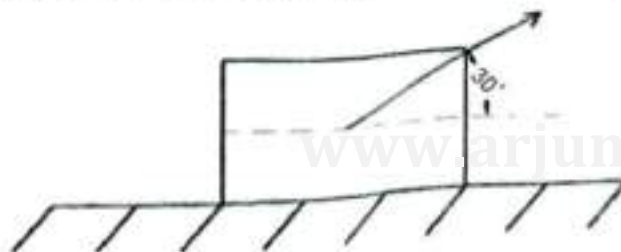


www.arjun00.com.np

1. a. Define rigid body and deformable body. List out the different types of forces. Also, state Lami's theorem and verify it. [6]
- b. A 160 N force P is applied at point A of the structural member. Replace P with [6]
 - a. Equivalent force couple at C .
 - b. Equivalent system consisting of a vertical force at B and second force at D .



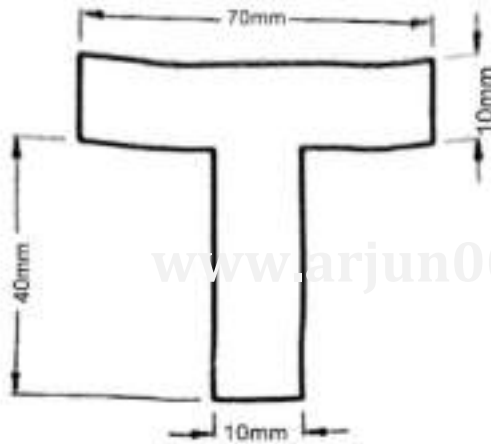
2. a. What do you know about free body diagram? Write down the general guidelines to draw free body diagram. Also, explain principle of transmissibility of forces. [2+2+2]
- b. A wooden block of weight 100 N rests on a horizontal plane. Determine the force required to just (a) pull it (b) push it. Take coefficient of friction $\mu=0.3$ for all surface. [6]



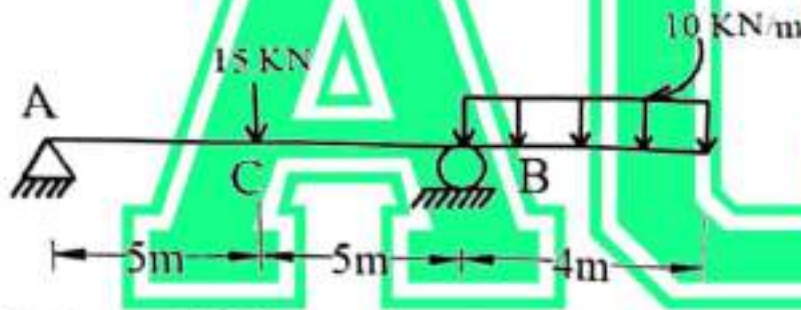
www.arjun00.com.np

Cont.

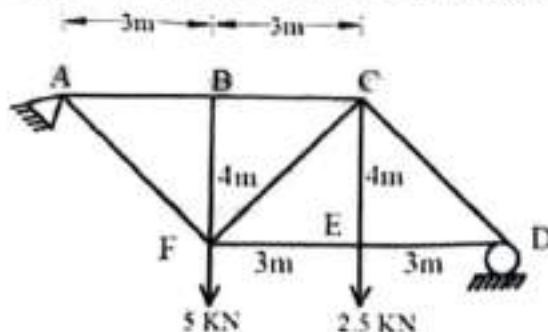
3. a. Define Centre of gravity, axis of symmetry, radius of gyration. State parallel axis theorem. [6]
 b. Calculate moment of inertia about centroidal axis. [6]



4. a. Write down the different types of support in the structure with figures. List out the different types of loads acting on a structure. [4]
 b. Calculate the support reaction and draw the SFD and BMD for the given beam. [8]



5. a. Define axial force, shear force and bending moment in structure with diagrams. [4]
 b. Find the member forces in CF and BF. [8]



6. a. Define friction. Discuss the laws of friction. [2+4]
 b. Define couple. Also, differentiate resultant and equilibrant forces. [1+5]



Good Luck !



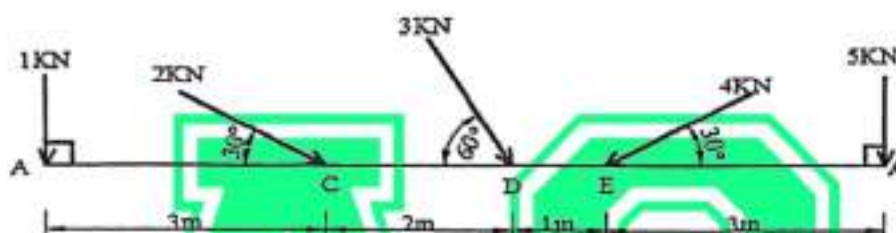
Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.



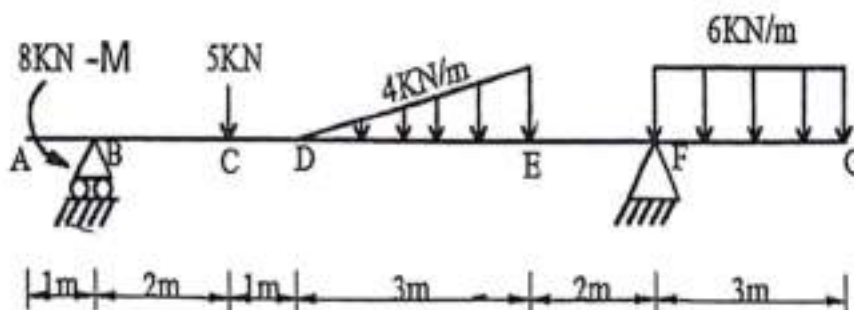
www.arjun00.com.np

Attempt any FIVE questions.

1. a. Define the applied mechanics. Classify the applied mechanics. [2+6]
- b. A horizontal beam AB of length 9m is acted upon by a set of forces as shown in figure below. Determine the magnitude, direction and position of the resultant force. [8]

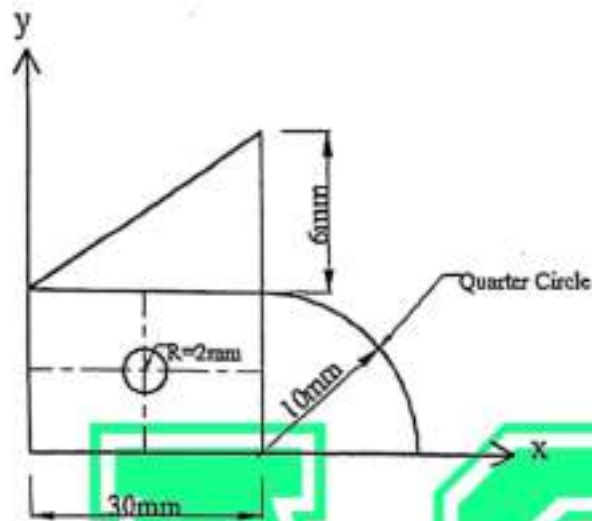


2. a. State and prove the Lami's theorem and mention the application of Lami's theorem. [2+4+2]
- b. A body weighing 5880 N is lying on a wooden plank with an inclination of 1 in 2. The coefficient of friction is 0.25. State if the body will rest on the plank or not. If the body moves down, what force parallel to plank is necessary to hold it back? [8]
3. a. State and prove the parallel axis theorem. [6]
- b. Find the reactions at support for given loaded beam as shown in below. [10]



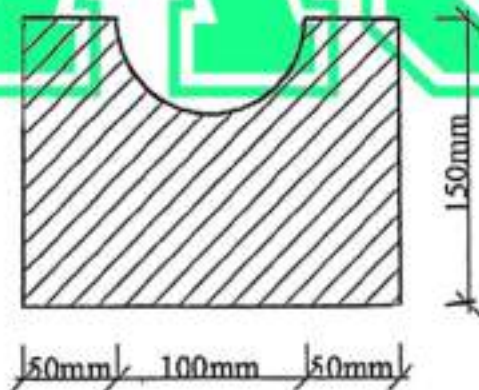
Cont.

4. a. Define the types of support condition with neat sketch. [6]
 b. Determine the M.O.I. of the given area as shown in figure about centroidal XX and YY axes. [10]



Radius of Circle = 2 mm

5. a. Find the centroid of the shaded plane area of given figure: [8]



- b. Define truss. Differentiate between method of joint and method of section. [2+6]
6. Write short notes on: (any **FOUR**) [4×4]
- Scope of applied mechanics
 - Free body diagram
 - Laws of dry friction
 - Principles of transmissibility
 - Statically determinate and indeterminate structure



www.arjun00.com.np

Good Luck !

Program: Diploma in Engineering ALL

Full Marks: 60

Year/Part: I/II (2021)

Pass Marks: 24

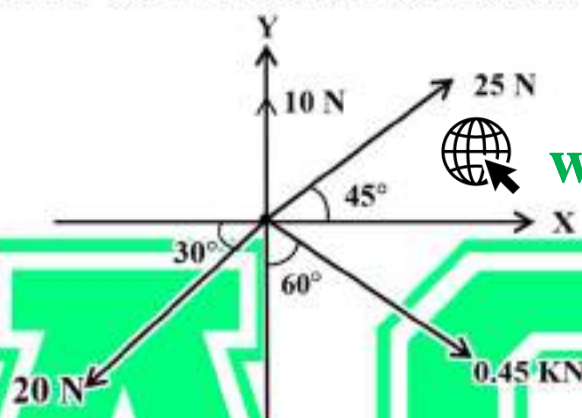
Subject: Applied Mechanics

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

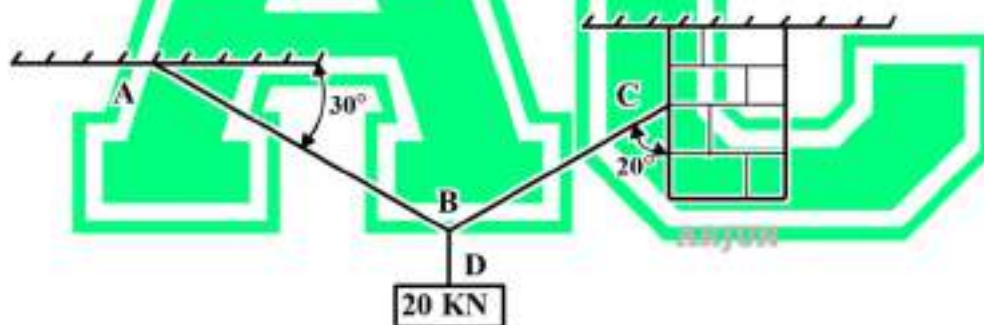
Attempt any **FIVE** questions.

1. a) Define Particle, Rigid Body and Deformable Body. [2+2+2]
 b) Find magnitude and direction of force. [6]



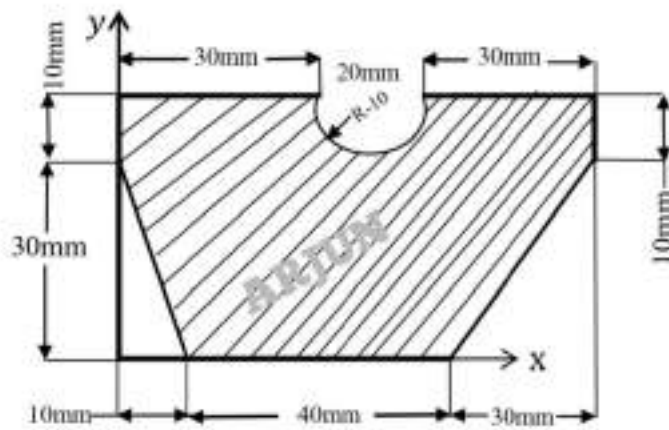
www.arjun00.com.np

2. a) State Lami's Theorem. Determine the tension on the rope AB and BC of the following system as shown in figure. [2+4]



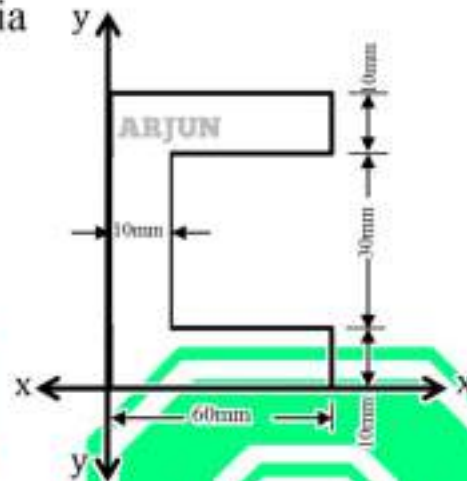
- b) Define free body diagram. Discuss briefly the steps to draw free body diagram with suitable example. [2+4]
3. a) What is friction? Also write law of static friction. [2+4]
 b) A load of 5 kN is lying on inclined plane whose inclination with the horizontal is 30° . The coefficient of friction between load and plane is 0.4. Find minimum and maximum horizontal force which will keep the load in equilibrium. [6]

4. a) Find the centroid of the following shaded region.



[6]

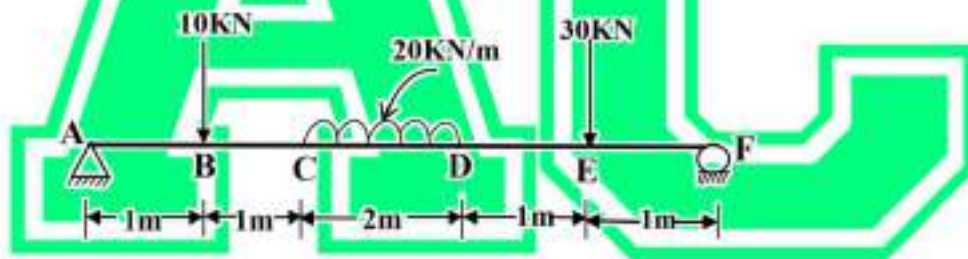
- b) Determine the moment of inertia about X-X and Y-Y axis.



[6]

5. a) Define Beam. Discuss its type.

- b) Find the support reactions of beam and draw shear force diagram and bending moment diagram.



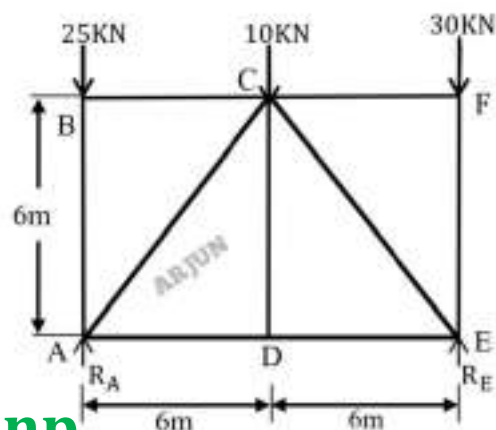
[1+3]

[8]

6. a) Differentiate structure and Mechanism. Also write down the condition for statically determinate beam.

[2+2]

- b) Determine the forces in the member AB, AD, and CE.



[8]





Back/Scholarship Exam-2080 Bhadra

Program: Diploma in Civil/Hydropower Engineering

Full Marks: 80

Year/Part: II/I (2013, 2017)

Pass Marks: 32

Subject: Applied Mechanics

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt any FIVE questions.



www.arjun00.com.np

1. a) Define applied mechanics. Define FBD, equilibrium and equation of static equilibrium. [2+2+2+2]

b) The following forces act at a point: [8]

i) 40 N inclined at 40° towards north of east

ii) 25 N towards north

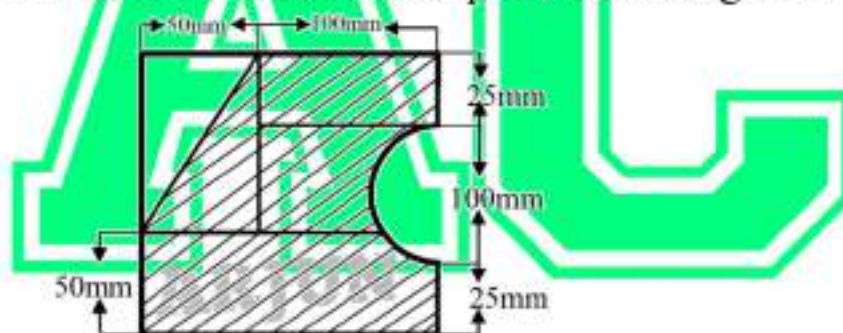
iii) 50 N towards north-west

iv) 60N inclined at 60° towards south of west

Find the magnitude and direction of the resultant.

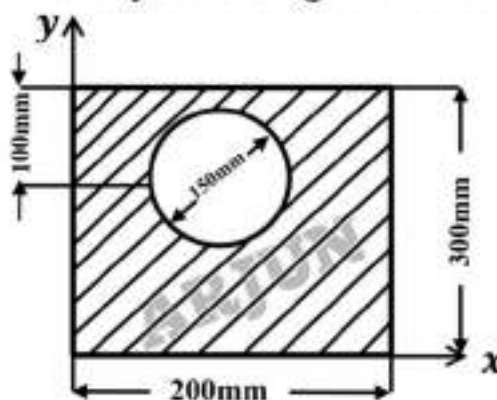
2. a) State and prove Lami's Theorem. [6]

b) Find the centroid of the shaded plane area of given figure: [10]



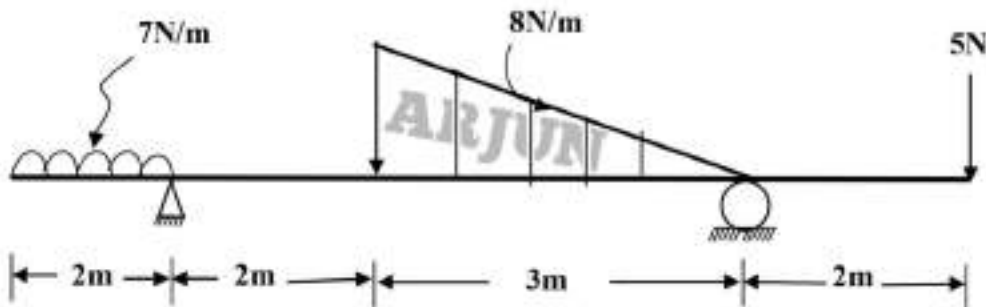
3. a) State and prove parallel axis theorem. [8]

b) Find the MOI about x and y axis of given shaded area shown in figure. [8]

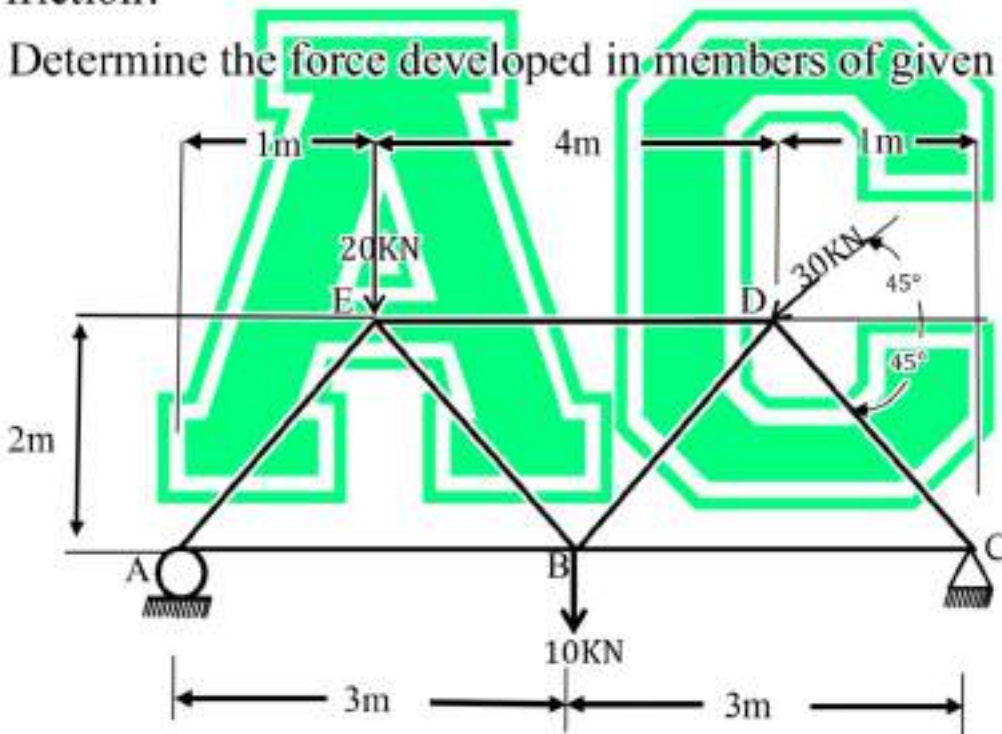


Cont.....

4. a) Derive the relationship between loads, shear and bending moment. [4]
- b) Find the support reactions at supports for given beam loaded as shown in figure. [6]



5. a) Define limiting friction. What are the characteristics of dry friction? [2+6]
- b) Determine the force developed in members of given truss: [8]



6. Write short notes on: (**any FOUR**) [4×4]
- Resolution and composition of forces
 - Angle of friction.
 - Moments and couple
 - Radius of gyration
 - Support and its types



www.arjun00.com.np

Good Luck!

AC

Regular/Back Exam-2079, Falgun, Chaitra

Program: Diploma in Engineering ALL

Full Marks: 60

Year/Part: I/II (2021) © Arjun

Pass Marks: 24

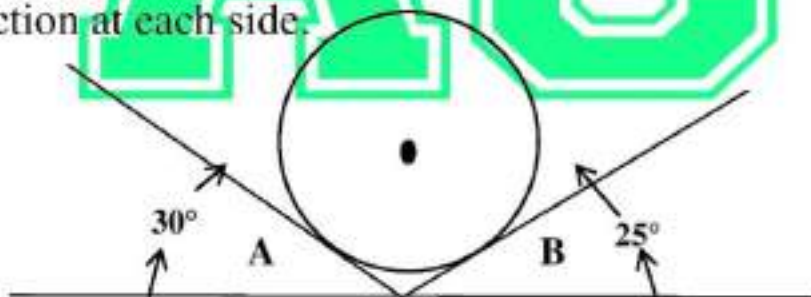
Subject: Applied Mechanics

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt ALL questions.
www.arjun00.com.np

1. a) Define applied mechanics with its scope in engineering. [1+2]
 b) The following forces act at a point, find the magnitude [6]
 and direction of resultant force.
 i) 25N inclined at 35° towards north of east.
 ii) 30N towards north.
 iii) 35N inclined at 45° towards north of west.
 iv) 40N inclined at 40° towards south of west.
2. a) Define Free Body Diagram. Write down the steps to [1+2]
 draw FBD.
 b) State and prove Lami's Theorem. [3]
 c) A spherical ball of weight 200N rests in a V-shaped [6]
 trough, whose sides are inclined shown in figure. Find
 the reaction at each side.

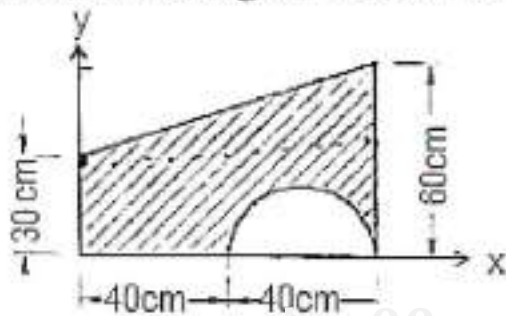


3. a) Define friction. Write down the laws of friction. [1+1]
 b) Explain the condition of tipping and sliding of a block. [4]

'OR'

A force of 100N pulls a body of weights 150N up in an inclined plane. The force being applied parallel to inclined plane. The inclined plane makes an angle of 30° with the horizontal. Calculate the coefficient of friction.

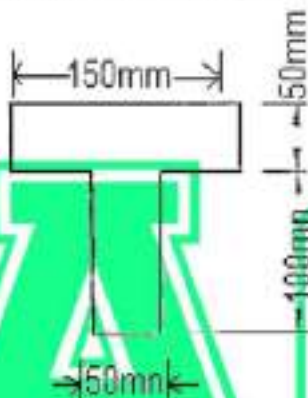
4. a) Locate the centroid of give shaded area. [8]



'OR'

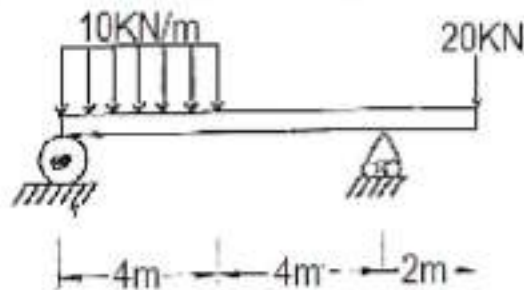
Define the terms: centre of gravity, center of mass, centroid and axis of symmetry.

b) State parallel axis theorem. Find the moment of inertia about centroidal x-axis of the given figure. [3+6]

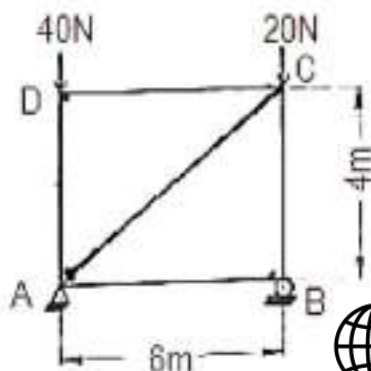


5. a) What are different types of loads in any structure. [2]

b) Draw SFD and BMD for the beam loaded as shown in figure. [10]



c) Determine the forces in each member of truss given in figure. [6]



Website :- <https://www.arjun00.com.np>

Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur
Regular/Back Exam-2079, Bhadra/Ashwin

Program: Diploma in Civil Engineering

Full Marks: 80

Year/Part: II/I (2013)

Website :- <https://www.arjun00.com.np>

Pass Marks: 32

Subject: Applied Mechanics

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

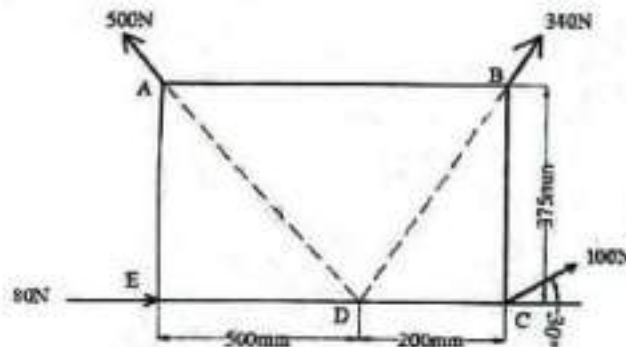
The figures in the margin indicate full marks.

Attempt any FIVE questions.

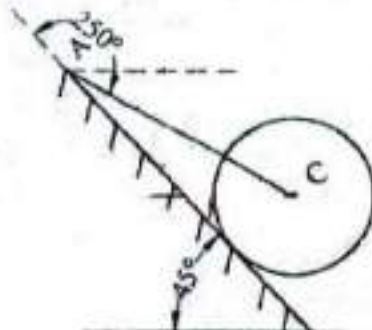


www.arjun00.com.np

1. a) Define Applied Mechanics with its scope. Write down the equation of static equilibrium in two and three dimensions. [3+3]
Website :- <https://www.arjun00.com.np>
- b) Four forces act on a 700x375 mm plate shown in figure. Find the resultant of the force and locate the points where the line of action of resultant intersect the edge of plate. [10]



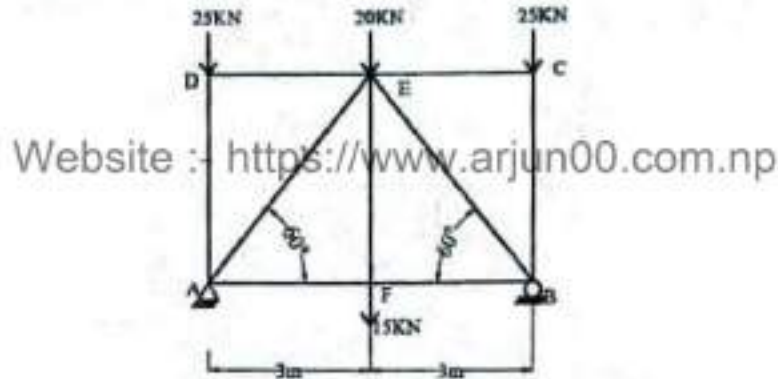
2. a) Define moment and couple. What are the characteristics of couple? [3+3]
- b) Explain about the principle of transmissibility of force with suitable diagram. [4]
- c) A Roller of weight 10KN rests on a smooth inclined plane and is kept free from rolling down by a string as shown in fig. below workout tension in the spring and reaction at the point of contact B. [6]



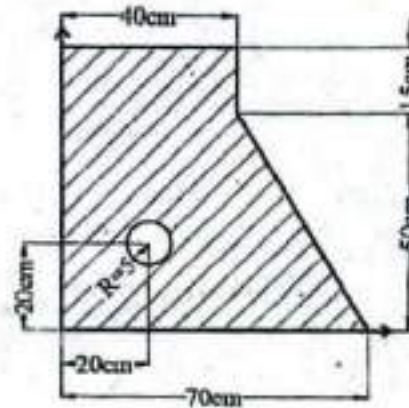
Cont.

Website :- <https://www.arjun00.com.np>

3. a) Define friction. Write down the laws for dry friction. [2+4]
b) Find the forces in the member of the given truss. [10]

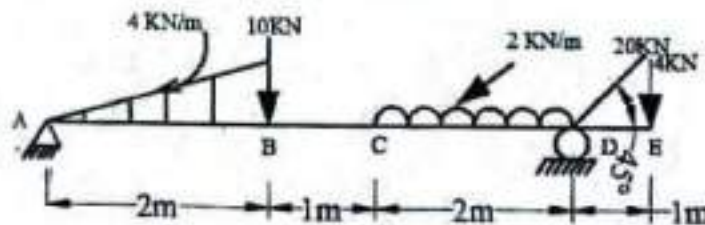


4. a) Locate the centroid of given shaded area. [10]



- b) Derive the relation between load, shear force and bending moment for a beam. [6]

5. a) State and prove parallel axis theorem. [6]
b) Find support reactions of given figure. [10]



6. Write short notes : (any **FOUR**) [4x4=16]

- Free body diagram
- Varignon's theorem
- Radius of gyration
- Statically determinate and indeterminate structure
- Condition of sliding and tipping of a body

Good Luck!



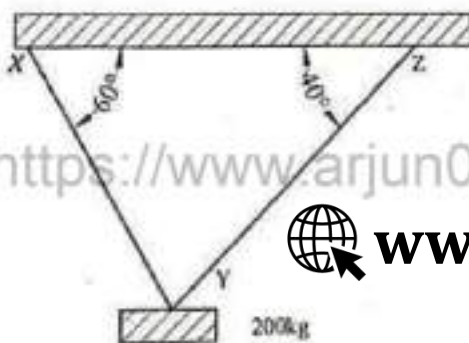
Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur
Regular/Back Exam-2078, Kartik/Mangsir

Program:	Diploma in Civil/Hydropower Engg.	Full Marks: 80
Year/Part:	III/I (2013, 2017)	Pass Marks: 32
Subject:	Applied Mechanics I	Time: 3 hrs

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt Any Five questions.

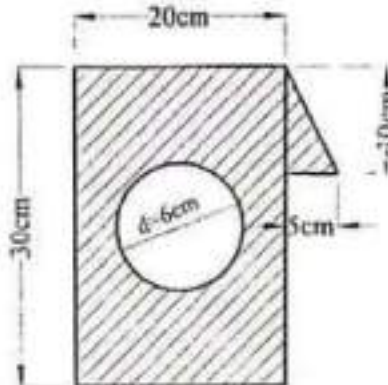
1. a) What do you mean by rigid and Deformed body? [2+6]
Explain Coplanar, Non-coplanar, like parallel and Unlike parallel Force. Website :- <https://www.arjun00.com.np>
b) Find the magnitude and direction of the resultant force [8]
for the following force: 40kg acting at $N30^{\circ}E$, 25kg acting at North, 50kg acting at $N45^{\circ}W$ and 60kg acting at $S30^{\circ}W$.
2. a) State and prove Lami's Theorem, [2+6]
b) Find the force in the cable XY and YZ as shown in figure. [8]



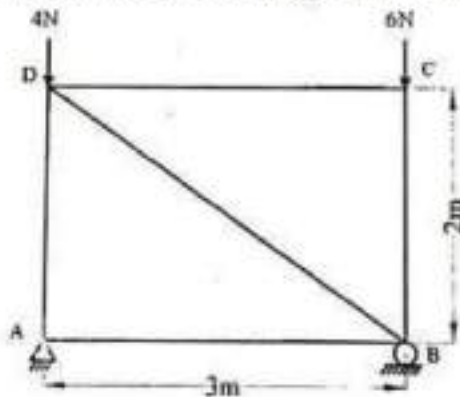
3. a) Define the terms friction and angle of friction. And also [8]
show the sliding and Tripling condition of the body with sketch.
b) A load of 50N is lying on inclined plane whose [8]
inclination with the horizontal is 30° . If the coefficient of friction between load plane is 0.4. Find the maximum and minimum horizontal force which will keep the load in equilibrium.

Cont.....

4. a) Define centroid and find the relation for centroid for rectangle. [2+4]
b) Find the MOI of the given section about centroidal axis parallel to the x-x axis. [10]



5. a) What do you mean by statically determinate structure? What are the different types of beam? [2+2]
b) Discuss about the method of analysis of truss [4]
c) A simply supported beam of 5m span carries of the UDL load of 10KN/m from left side of the beam to the center and 5KN each at 1m and 2m from the left and right hand support respectively. Find the support reaction. [8]
6. a) Find the member force of the given truss. [8]



- b) Write Short notes on : **(Any Two)** [4x2=8]
i) Triangle Law of Forces
ii) Parallel axis Theorem for moment of Inertia
iii) Different types of load and support in structure.

Good Luck!