

KATHMANDU UNIVERSITY
End Semester Examination[C]
May/June 2019

Marks Scored:

Level : B. E.

Course : CIEG 203

Year : II

Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date 02 JUN 2019

SECTION "A"

[20Q. \times 0.5 = 10 marks]

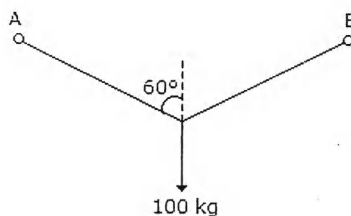
Encircle the most appropriate answer.

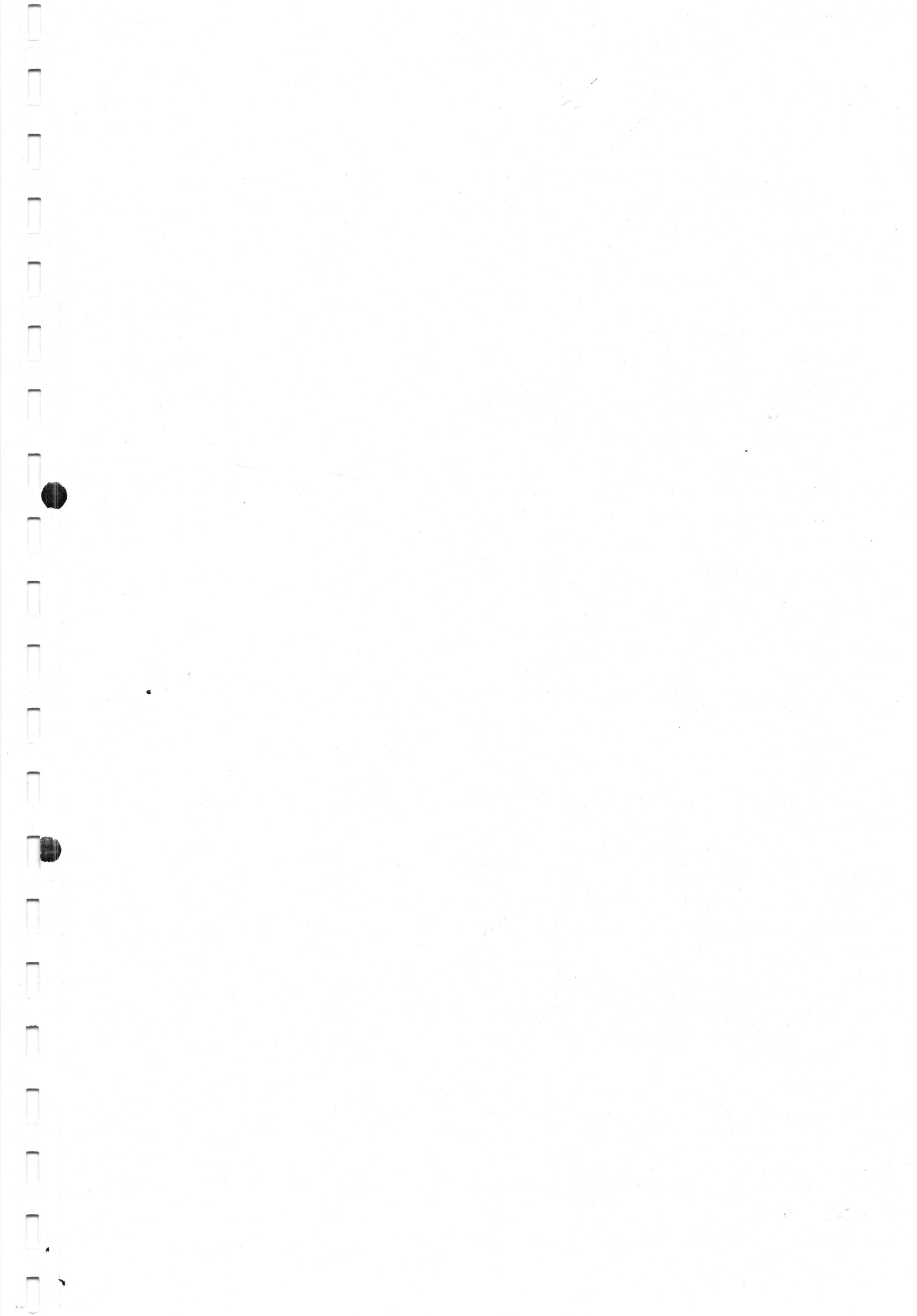
- The forces which meet at one point and have their lines of action in different planes are called
 - coplaner and non-concurrent forces
 - non-coplaner and concurrent forces
 - non-coplaner and non-current forces
 - intersecting forces
- Which of the following needs to zero for the perfect equilibrium?
 - $\sum F=0$, $\sum M=0$ and $\sum \theta = 0$
 - $\sum F=0$, $\sum M \neq 0$ and $\sum \theta = 0$
 - $\sum F \neq 0$, $\sum M=0$ and $\sum \theta = 0$
 - $\sum F=0$, $\sum M=0$ and $\sum \theta \neq 0$

Where F is force, M is moment and θ is rotation
- What is parallel axis theorem and to whom it is applied?
 - Theorem used to add the two mutually perpendicular moment of inertias for linear distances
 - Theorem used to add the two mutually perpendicular moment of inertias for vectors
 - Theorem used to add the two mutually perpendicular moment of inertias for areas
 - Theorem used to add the two mutually perpendicular moment of inertias for volumes
- Which of the following kinetic friction is smaller?
 - Limiting friction
 - Static friction
 - Rolling friction
 - Sliding friction
- If a number of forces act simultaneously on a particle, it is possible
 - Not to replace them by a single force
 - To replace them by a single force through C.G
 - To replace them by a single force and a couple
 - To replace them by a single force
- The radius of gyration is related to the moment of the body. So the calculation of the moment of the body due to the loadings involve a quantity called
 - Moment
 - Inertia
 - Moment of Inertia
 - Rotation
- Which of the following is correct?
 - The direction of the unknown is of no use, it is not founded
 - The direction of the unknown can't be determined
 - The direction of the unknown force is known to us already
 - The direction of the unknown force we take the assumption of it

8. All the vectors quantities obey:
- Parallelogram law of multiplication
 - Parallelogram law of addition
 - Parallelogram law of addition of square root of their magnitudes
 - Parallelogram law of addition of square of their magnitudes
9. Pick up the incorrect statement from the following:
- The Centre of Gravity of a circle is at its centre
 - The Centre of Gravity of a triangle is at the intersection of its medians
 - The Centre of Gravity of a rectangle is at the intersection of its diagonals
 - The Centre of Gravity of a semicircle is at a distance of $r/2$ from the centre
10. During the impact, the Kinetic Energy of a body
- Remain constant
 - Before impact is more than that after impact
 - Before impact is less than that after impact
 - Before impact is equal to that after impact
11. The shape of a suspended cable under its own weight, is
- Elliptical
 - Catenary
 - Circular
 - Parabolic
12. Centre of Gravity of a thin hollow cone lies on the axis of symmetry at a height of
- One-half of the total height above base
 - One-third of the total height above base
 - One-fourth of the total height above base
 - None of these
13. Minimum potential energy of a system will be in the position of
- Stable equilibrium
 - Unstable equilibrium
 - Neutral equilibrium
 - During the motion
14. The motion of a bicycle wheel is
- Translatory
 - Rotary
 - Rotary and translator
 - Curvilinear
15. The point about which combined motion of rotation and translation of a rigid body takes place, is known as
- Virtual centre
 - Instantaneous centre
 - Instantaneous axis
 - Point of rotation
16. If two forces acting at a point are in equilibrium, they must be equal in magnitude and their line of action must be along
- The same line in the same sense
 - The same line in opposite sense
 - The perpendicular to both the lines
 - None of these

17. One end of an elastic string of natural length 'L' and modulus 'E' is kept fixed while to the other end is attached a particle of mass m which is hanging freely under gravity. The particle is pulled down vertically through a distance 'x', held at rest and then released. The motion is
- A rectilinear motion and curvilinear motion
 - A rectilinear motion with constant speed
 - A curvilinear motion
 - A simple harmonic motion
18. When a body moves round a fixed axis, it has
- A rotary motion
 - A circular motion
 - A translator
 - A rotary motion and translatory motion
19. The product of mass and velocity of a moving a body, is called
- Moment
 - Momentum
 - Power
 - Impulse
20. A weight of 100 kg is supported by a string whose ends are attached to pegs 'A' and 'B' at the same level shown in below figure. The tension in the string is
- 50 kg
 - 75 kg
 - 100 kg
 - 120 kg





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F. M. : 40

SECTION "B"

Attempt ALL questions.

1. Draw Shear Force Diagram and Bending Moment Diagram for the beam shown in Figure 1.

[10]

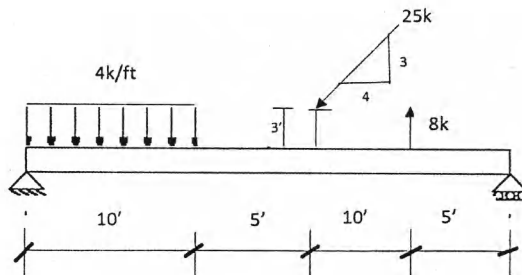


Figure 1

2. Determine the member forces of the given truss shown in Figure 2. Also State the nature of forces. (Show the results in tabular form). Draw clearly free body diagrams for each joints.

[8]

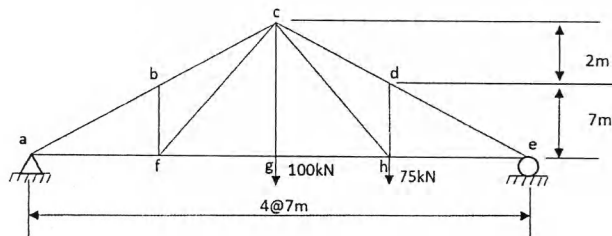


Figure 2

3. Determine the moment of inertia of the plane area shown in Figure 3, about its centroidal axis.

[6]

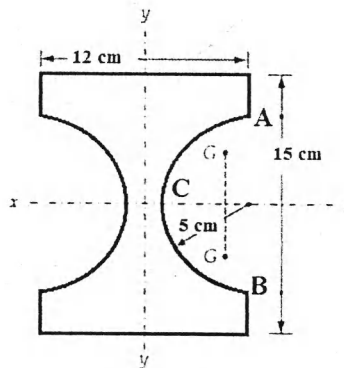


Figure 3

4. State laws of dry friction. A 30 kg block is dropped from a height of 2 m onto the 10 kg pan of a spring scale, shown in Figure 4. Assuming the impact to be perfectly plastic, determine the maximum deflection of the pan. The constant of the spring is $K = 20 \text{ kN/m}$. Draw clearly free body diagram. [2+6]

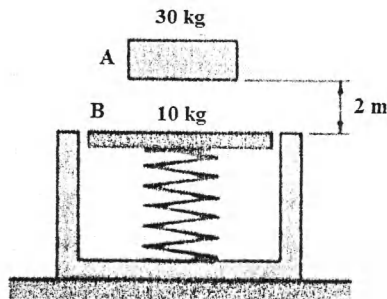


Figure 4

5. Define the General Plane Motion of Rigid Body, illustrate with example. A 20lb collar slides without friction along a vertical rod as shown in Figure 5. The spring attached to the collar has an undeformed length of 4 in. and a constant of 3 lb/in. if the collar is released from rest position 1, determine its velocity after it has moved 6 in. to position 2. Draw clearly free body diagram. [2+6]

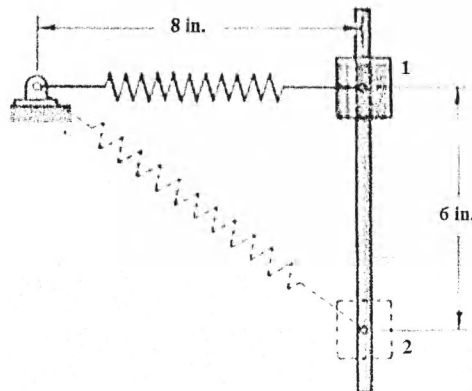


Figure 5