

KATHMANDU UNIVERSITY
End Semester Examination
February/March 2019

Marks Scored:

Level : B. E.
Year : II

Course : CIEG 203
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date 05 MAR 2019

SECTION "A"

[20Q × 0.5 = 10 marks]

Encircle the most appropriate answer.

- If the applied force is equal to or less than the maximum allowable friction force, the
 - equilibrium is maintained
 - motion occurs
 - vertical reaction is more than applied force
 - angle of repose is maximum
- Maximum value of frictional force is proportional to
 - Applied force
 - Normal reaction
 - Internal angle of friction
 - Internal molecular structure of body
- In truss, loads are applied to the
 - Mid-point of a member
 - Various joints
 - Top members only
 - Bottom members only
- For a simple truss the sum of the members and reaction components at the supports should be equal to
 - Two times its number of joints
 - Three times its number of joints
 - Four times its number of joints
 - Number of joints
- Polar Moment of Inertia (MoI) for non-circular area is equal to the
 - Summation of MoI along x-axis and y-axis
 - Subtraction of MoI along x-axis and y-axis
 - Multiplication of MoI along x-axis and y-axis
 - Ratio of MOI along x-axis to MoI along y-axis
- Moment of Inertia of an area is
 - First moments of the area
 - Second moments of the area
 - Third moments of the area
 - Fourth moment of the area
- The moment of an area is always
 - smaller with respect to a centroidal axis than with respect to any parallel axis
 - greater smaller with respect to a centroidal axis than with respect to parallel any parallel axis
 - smaller with respect to parallel axis than with respect to a centroidal axis
 - greater with respect to parallel axis than with respect to a centroidal axis
- The first moment of the area can be expressed as the
 - Summation of distance and area
 - Product of distance from any point and area
 - Product of the area and the coordinates of its centroid
 - Ratio of area and force

9. The unit of MOI is expressed as
 a) Unit of length
 b) Square of unit of length
 c) Cube of unit of length
 d) Fourth power of unit of length
10. When a beam is subjected to concentrated loads only, the shear force is
 a) Constant between loads
 b) Linearly change between loads
 c) Zero between span
 d) Zero at support
11. The unit of uniformly distributed load is
 a) N/m
 b) Nm
 c) Nm²
 d) Nm⁴
12. The unit of work done is
 a) Nm²
 b) Nm
 c) Nm²
 d) Nm⁴
13. In uniform rectilinear motion
 a) Acceleration is constant
 b) Covering equal distance in different interval of times
 c) Velocity is constant
 d) Velocity is not constant
14. In projectile motion, uniformly accelerated motion gives
 a) Horizontal range
 b) Maximum velocity
 c) Velocity is zero
 d) Greatest elevation
15. Principle of work and energy states that
 a) Workdone is change in KE
 b) Change in workdone is KE
 c) KE and PE are equal
 d) KE is always constant
16. Choose the correct one
 a) The work of the force is independent of path followed and is equal to minus the change in potential energy
 b) The work of the force is independent of path followed and is equal to change in potential energy
 c) The work of the force is dependent of path followed and is equal to change in potential energy
 d) The work of the force is dependent of path followed and is equal to minus the change in potential energy
17. Work done is only considered by
 a) Internal force
 b) Internal force with molecular change
 c) External force without displacement
 d) External force with displacement
18. Kinetic energy is always
 a) Positive
 b) Negative
 c) Zero
 d) Constant
19. Potential energy is defined by
 a) Change in velocity of body
 b) Rate of change of momentum
 c) Position of a body
 d) Rate of change acceleration
20. Impulse is the
 a) Change in momentum
 b) Change in acceleration
 c) Change in velocity
 d) Change in mass

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SECTION "B"

Attempt ALL questions.

1. A uniformly distribute load of 2 kN/m is applied between AB and a clockwise moment is also applied at point B of simply supported beam as shown in Figure 1. Draw Shear Force and Bending Moment diagram for the beam and also locate the point of contraflexure. [10]

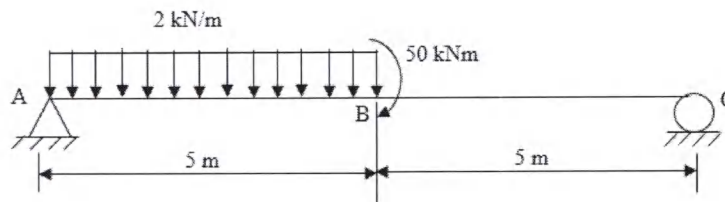


Figure 1

2. A block of weight $W_1=100\text{N}$ rests on an incline plane and another weight W_2 is attached to the first weight through a string as shown in Figure 2. If the coefficient of friction between the block and plane is 0.3, determine the maximum and minimum values of W_2 so that equilibrium can exist. [6]

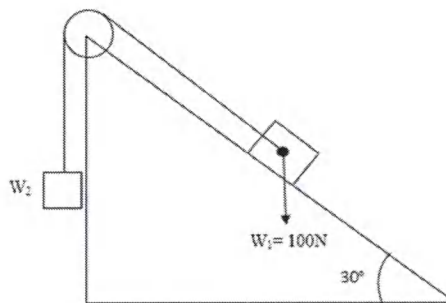


Figure 2

3. Determine the member forces of the given truss shown in Figure 3. Also State the nature of forces. (Show the results in tabular form). Draw clearly free body diagram. [8]

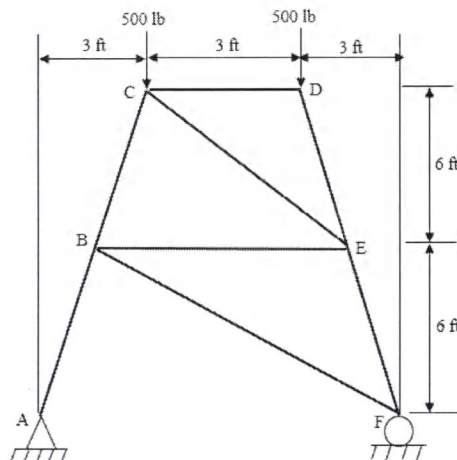


Figure 3

4. State laws of dry friction. A 10 kg package drops from a chute into a 25 kg cart with a velocity of 3 m/s shown in Figure 4. Knowing that the cart is initially at rest and may roll freely, determine
- the final velocity of the cart,
 - the impulse exerted by the cart on the package,
 - the fraction of the initial energy lost in the impact.
- [2+6]

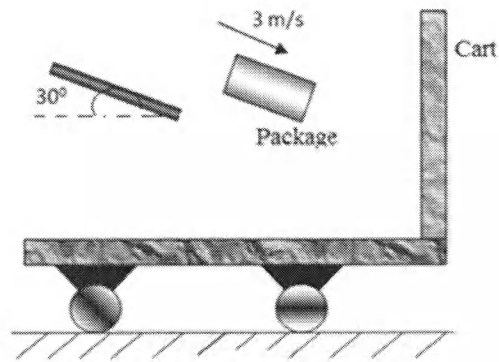


Figure 4

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 unreformed 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.

[3+5]

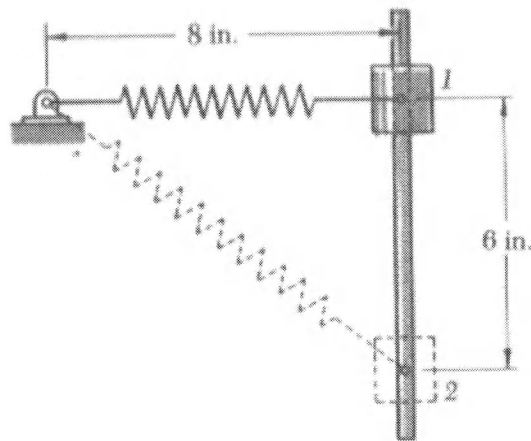


Figure 5