Question Paper

Exam Date & Time: 08-May-2018 (09:30 AM - 12:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES I SEMESTER B.S. (ENGG.) END - SEMESTER THEORY EXAMINATIONS MAY - 2018 DATE: 08 MAY 2018 TIME: 9:30 AM TO 12:30 PM Engineering Statics and Dynamics [CE 111]

Marks: 100

Duration: 180 mins.

Answer 5 out of 8 questions.

| 1) | State Newton's three laws of motion | (6) |
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- A)
- ^{B)} Obtain the resultant of the concurrent coplanar forces ⁽⁴⁾ acting as shown in Fig. 1B.



^{C)} Obtain the magnitudes of the forces P and Q if the resultant of the system shown in Fig.1.C is zero . (10)







^{B)} Find the Support reactions for the given beam loaded as ⁽¹²⁾ shown in the Fig 2B.



2)

State and Prove VARIGNON'S THEOREM by Scalar

- ^{A)} formulation.
- ^{B)} Find the forces in the members of the cantilever truss (by ⁽¹²⁾ method of joints) shown in Fig.3B



⁴⁾ Locate the centroid of shaded area shown in Fig.4A. ⁽¹²⁾

A)



^{B)} Compute the M.I. about the base(bottom) for the area ⁽⁸⁾ given in Fig.4B.



Derive the relationship between tight side and slack side (10) forces in a rope.

A) B)

5)

Block A weighing 1000N rests over block B of weight (10) 2000N as shown in Fig.5B. Block A is tied to the wall with a horizontal string. If coefficient of friction between A & B is 0.25 and between B and the floor is 0.33, what should be the value of 'P' just to move the block B ?



Fig 5B

6)

A car is negotiating a 200m radius curve at a speed of (10) 20Kmph.

i) What is the minimum Coefficient of friction required to prevent skidding on a level road.

ii) If the coefficient of friction is 0.4, then what is the maximum speed.

^{B)} In a circus show, a motorcyclist is moving inside a spherical cage of radius 3m. The motorcycle and the man together weigh 7250N. Find the least velocity with which

(10)

the motorcycle must pass the highest point on the cage without losing contact of the inside of the cage.

⁷⁾ Determine using work energy principle the velocity of block ⁽¹⁰⁾ shown in Fig.7A after it has moved 50m starting from rest. Assume $\mu = 0.2$.



^{B)} Two masses of 5 kg and 3 kg rest on two smooth inclined ⁽¹⁰⁾ plane as shown in Fig.7B, each of inclination 30^{Â^o} and are connected by a string passing over a common apex. Find the velocity of 3 kg mass after 2 sec when released from rest. Find the distance it will cover before changing direction of motion, if 5kg mass is cut off after two sec of its release from rest.



⁸⁾ Two bodies, one of which 19.6kg mass with a velocity of (20)10m/s and other of 9.8kg mass with a velocity of 10m/s move towards each other and impinge centrally. Find the velocity of each body after impact and loss of K.E due to impact. Take e = 0.8.