Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
July, 2017

Level : B. E.		Course	: CIEG 203
Year : II		Semester	: I
Exam Roll No. :	Time: 30 mins.	F. M.	: 10
Registration No.:		Date	: JUL 07 2017

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Tick the correct answer.

1. When a body slides down an inclined surface, the acceleration (f) of the body, is given by
   a) $f = g$ b) $f = g \tan\theta$ c) $f = g \sin\theta$ d) $f = g \cos\theta$

2. Two parallel forces 20kg and 15 kg act. In order that the distance of the resultant from 20kg force may be the same as that of the former resultant was from 15 kg, the 20 kg force is diminished by
   a) 5.5 kg b) 6.25 kg c) 8.75 kg d) 10.5 kg

3. The center of gravity of a quadrant of a circle lies along its central radius at a distance of
   a) 0.8 R b) 0.6 R c) 0.4 R d) 0.2 R

4. For a body moving with simple harmonic motion, the number of cycles per second, is known as its
   a) Oscillation b) Frequency c) Periodic Time d) Amplitude

5. P is the force acting on a body whose mass is m and acceleration is f. The equation $P - mf = 0$, is known as
   a) Equation of Equilibrium b) Equation of Static
   c) Equation of Energy d) Equation of Dynamics

6. The masses of two balls are in the ratio of 2:1 and their respective velocities are in the ratio of 1:2 but in opposite direction before impact. If coefficient of restitution is 0.5, the velocities of separation of balls will be equal to
   a) Original velocity in same direction
   b) Half the original velocity in same direction
   c) Half the original velocity in opposite direction
   d) Original velocity in the opposite direction

7. If the gravitational acceleration at any place is doubled, the weight of a body will
   a) be reduced to half b) be tripled c) be doubled d) not be affected

8. The tension in a cable supporting a lift
   a) is more when lift is moving downwards b) is less when lift is moving upwards
   c) remains constant d) is less when the lift is moving downwards

9. The C.G. of a right circular cone lies on its axis of symmetry at a height of
   a) h/2 b) h/3 c) h/4 d) h/5

10. Two forces of 6 N and 8 N which are acting at right angles to each other will have a resultant of
a) 5 N b) 8 N c) 10 N d) 12 N

11. For a particle moving with a S.H.M. , the frequency is
a) Directly proportional to periodic time
b) Inversely proportional to periodic time
c) Inversely proportional to its angular velocity
d) Directly proportional to its angular velocity

12. Total number of instantaneous centre of a machine having n links is,
a) n b) 2n c) (n-1) d) n(n-1)/2

13. A projectile is fired at an angle θ to the vertical. Its horizontal range will be maximum when θ is,
a) 0^0 b) 30^0 c) 45^0 d) 60^0

14. A stone is whirled in a vertical circle, the tension in the string is maximum
a) when the stone is at lowest position b) when the stone is at highest position
c) when the stone is in at horizontal d) at all positions

15. The C.G. of a 10 X 15 X 5 cm T-section from its bottom, is
a) 8.75 cm b) 8.80 cm c) 8.85 cm d) 8.90 cm

16. The practical unit of work is,
a) Erg b) Joule c) Newton d) Dyne

17. The ratio of speed of a rolling cylinder to the speed of sliding cylinder is
a) less than 1 b) equal to 1 c) between 1 and 2 d) greater than 2

18. The angular speed of a car while taking a circular turn of radius 100m at 36 km/hr. is
a) 0.1 radian/sec. b) 1 radian/sec. c) 100 radian/sec. d) 1000 radian/sec.

19. D' Alembert's principle is a principle of
a) Static equilibrium b) Dynamic equilibrium
c) Kinetics of rigid bodies d) Kinematics

20. The work done on a body is equal to the K.E. that the body has gained. This is called the principle of
a) work energy b) work power energy
c) work kinetic energy d) power gain

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SECTION "B"

Attempt *ANY FIVE* questions. All questions carry equal marks.

1. Two forces P and Q acting at a point have a resultant R. If Q be doubled, R is doubled. Again if the direction of Q is reversed, then R is doubled, show that: $P : Q : R = \sqrt{2} : \sqrt{3} : \sqrt{2}$ [8]

2. Where a circular hole of 1 m radius must be punched out of a circular disc of 3 m radius so that C.G. of the remainder be 2 cm from the centre of the disc? [8]

3. A system consisting of two blocks connected by a cable as shown in **figure 1**below.The masses of the block A and block B are 7.5 kg and 25 kg respectively. Determine the magnitude of minimum force and its inclination with reference to horizontal,to be applied on block B. The block have impending motion towards the right. Take the coefficient of friction at all contact surfaces to be 0.28. [8]

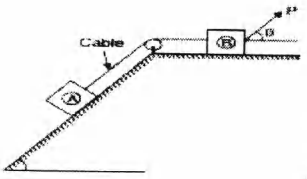

figure 1

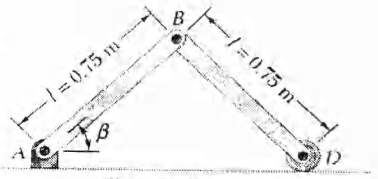

figure 2

4. A stationary flywheel of 0.5 m diameter is subjected to a constant torque of 200 Nm so that the wheel attains a speed of 100 r.p.m. , in 3 minutes time. Determine : [8]
i) Angular acceleration
ii)Number of revolutions made during this time
iii)Work done to attain the speed , and
iv) Circumferential (peripheral) speed of wheel at 100 r.p.m.

5. A pile of mass 500 kg is driveninto ground by dropping freely a hammer of mass 318 kg through a height of 2.7 m. If the pile is driven into the ground by 0.15m , calculate the average resistance of soil. [8]

6. For **figure 2**, each of the two slender rods has a mass of 6 kg. The system is released from rest with $\beta = 60^{\circ}$.Determine *a*) the angular velocity of rod *AB* when $\beta = 20^{\circ}$, and *b*) the velocity of the point *D* at the same instant. [8]

7. Write short notes : [4+4]
i) Simple Harmonic Motion ii) Method of section and method of joints