Pokhara University

|  |  |  |
| --- | --- | --- |
| Level: Bachelor | Semester – Fall | Year : 2011 |
| Programme: BE | | Full Marks: 100 |
| Course: Applied Mechanics | | Pass Marks: 45 |
| Time : 3hrs. |

|  |
| --- |
| *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 the questions. |

|  |  |  |
| --- | --- | --- |
|  | 1. The ring shown in figure is subjected to two forces, **F1** and **F2**. If it is required that the resultant force have a magnitude of 1kN and be directed vertically downward, determine: 2. The magnitudes of **F1** and **F2** provided θ =300. 3. The magnitudes of **F1** and **F2** if **F2** is to be a minimum   \\Anup\doc\IMG_0001 copy.jpg   1. Three homogeneous cylinders of same material and length having radii 40cm, 60cm and 50cm are piled in a rectangular ditch as shown in figure. The cylinder A has weight 15kN. Draw the free body diagram of each cylinder and determine the forces exerted at each contact points.   m | 7  8 |
|  | 1. The coefficients of friction between the block and incline surface are . Determine whether the block is in equilibrium and find the magnitude and direction of friction force when and force P=100N.      1. By direct integration method, find centroid of the shown shaded area with respect to given axes. | 8  7 |
|  | 1. As cam A rotates, follower wheel B rolls without slipping on the face of the cam. Knowing that the normal components of the acceleration of the points of contact at C of the cam A and the wheel B are 0.66m/s2 and 6.8m/s2 respectively, determine the diameter of the follower wheel.      1. A motorist is travelling on a curved portion of a highway of radius 750m at a sped of 100km/hr. the brakes are suddenly applied, causing the speed to decrease at a constant rate. Knowing that after 8s speed has been reducing to 75km/hr. Determine the acceleration of the automobile immediately after the brakes have been applied. | 8  7 |
|  | The two blocks shown are connected by an inextensible string passing over a smooth pulley as shown in figure. The coefficient of friction between the blocks and inclines are µs=0.25 and µk=0.15. Neglecting the masses of the pulleys, determine:   1. the common acceleration of the systems 2. tension in the cable 3. reaction at the pulley 4. distance moved by the body in 3seconds starting from rest | 15 |
|  | A system consists of three particles A, B, C. We know that mA = 5 kg, mB = 4 kg and mC = 3 kg that the velocities of the particles expressed in m/s are respectively, **VA** = 2**i** + 3**j -** 2**k**, **VB** = Vx**i** + Vy**j +Vz k**, and **VC** = -3**i** -2**j** + **k**. Determine: (a) the components Vx and Vz of the velocity of the particle B for which the angular momentum Ho of the system about O is parallel to the X-axis, (b) the value of Ho.    **OR**  A 250 kg block slides down an inclined having slope 300. It start from rest and after moving 1.8m, strikes a spring whose modulus is 18N/cm. if the coefficient of friction is 0.2, determine the maximum compression of the spring and maximum velocity of the block. Assume the impact is perfectly plastic, find the maximum force developed by the spring. | 15 |
|  | 1. The rod AB can slide freely along the floor and the inclined plane. At the instant shown the velocity of end A is 1.4m/s to the left. Determine: 2. Angular velocity of the rod 3. The velocity of the end B of the rod      1. A stepped cylindrical pulley and two loads are connected by inextensible cords as shown in figure. The mass of cylinder is 125 kg with radius of gyration 55cm. If the system is released from rest, determine the angular acceleration of the pulley and the time required for block A to move by 2.5m. | 8  7 |
|  | Write short notes on **any two:**   1. Total energy of a rigid body in plane 2. D’Alemberts Principle 3. Radial and transverse components of velocity and acceleration | 2×5 |