SUBJECT CODE:- 255
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(MECH/PROD) Examination Nov/Dec 2015
Theory of Machines-II
(Revised)

[Time: Three Hours]   [Max. Marks: 80]

"Please check whether you have got the right question paper."

N.B   i) Solve any three questions from each section.
         ii) Assume suitable data, if required.

Section A

Q.1   a) What do you understand by the interference & under cutting?   04
        b) Two 20^0 involvte spur gear mesh externally &give a velocity ratio 0 & 3. The module is 3mm and the   09
           addendum is equal to 1.1 module. If the pinion rotates at 120 r.p.m. determine the
              i.   Minimum number of teeth on each wheel to avoid interference
              ii.   Control ratio.

Q.2   a) Derive an expression of spiral gears efficiency   06
        b) The following data relate to two spiral gear in mesh. Spiral angle=90, centre distance (Approximate)=   07
           160mm. normal pitch=8mm gear ratio=3 friction angle=5^0 for maximum efficiency of the drive, determine
           the
              i.   Spiral angles of the teeth
              ii.   Number of teeth
              iii. Centre distance (exact)
              iv.   Efficiency

Q.3   a) Explain with neat sketch inertia type governor.   04
        b) The arms of a porter governor are 300mm long. The upper arms are pivoted on the axis of rotation. The   09
           lower arms are attached to a sleeve at a distance of 40mm. from the axis of rotation. The mass of the load
           on the sleeve is 70kg & the mass of each ball is 10 kg. Determine the equilibrium speed when the radius of
           rotation of the balls is 200mm. if the friction is equivalent to a load of 20N. at the sleeve what will be
           range of speed for this rotation.

Q.4   a) Draw the turning moment diagram of a single cylinder double acting steam engine   04
        b) A single cylinder- double acting steam engine develops 150kw at a mean speed of 80 rpm. The coefficient 09
           of fluctuation of energy is 0.1 and the fluctuation of speed is $\pm 2\%$ of mean speed. If the mean diameter of
           the flywheel rim is 2 metre and the hub & spowes provide 5% of the rotational inertia of the flywheel. Find
           the mass & cross sectional area of the flywheel rim Assume density of cast iron material as 7200 kgs/m^3.

Q.5   a) Explain what do you understand by initial tension in a belt   03
        b) Discuss merits & demerits of belt rope & chain drive   03
        c) A shaft rotating at 200 rpm drives another shaft at 300 rpm and transmit 6 kw through a belt. The belt is 08
           100mm wide & 10mm thick. The distance between the shaft is 4m. the smaller pulley is 0.5m in diameter
           calculate the stress in the belts if it is i) an open belt drive
           2) a cross belt drive
           Take $\mu = 0.3$

SECTION-B

Q.6   a) Explain the effect of the gyroscope couple on four wheeler.   05
        b) The rotor of the turbine of a ship has a mass of 2500kg & rotates at a speed of 3200rpm. Counter   08
           clockwise when viewed from stern. The rotor has radius of gyration of 0.4m. Determine the gyroscopic
           couple & its effect when.
              i.   The ship steers to the left in a curve of 80m radius at a speed of 15 Khots (1 knot=1860m/h)
              ii.   The ship pitches 5 degrees above and 5 degrees below the normal position and the bow is

descending with its maximum velocity the pitching motion is simple harmonic with a periodic time of 40 seconds

iii. The ship rolls & at the instant, its angular velocity is 0 4 rad/s. clockwise when viewed from stern. Also find the maximum angular acceleration during pitching

Q.7 a) Explain the different laws of frictions. 06

b) A single dry plate clutch transmits 7.5 kw at 900 rpm. The axial pressure is limited to 0.07 N\mm². If the coefficient of friction is 0.25, find 07

1. Mean radius & the width of the friction lining assuming the ratio of the mean radius to the face width as 4 and
2. Outer & inner radii of the clutch plate.

Q.8 a) Define & explain 06

i. Longitudinal vibration
ii. Transverse vibration
iii. Torsional vibration

b) A circular cylinder of mass 4kg radius 150 mm is connected by a spring of stiffness 4000 N/m as shown in fig no-01 .it is free to roll on horizontal rough surface without slipping. Determine the natural frequency 07
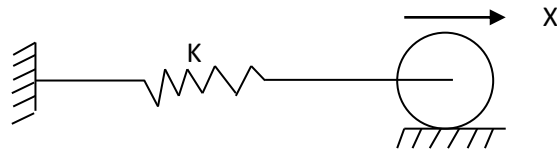

Fig no.-1

Q.9 a) Define and explain logarithmic decrement & damping factor. 06

b) In a single degree admired vibrating system a suspended mass of 8 kg makes 30 oscillation in 18 seconds. The amplitude decreases to 0.25 of the initial value after 5 oscillations. determine the 07

i. Stiffness of spring
ii. Logarithmic decrement
iii. Damping factor
iv. Damping coefficient

Q.10 a) Explain the transmissibility 04

b) Explain with neat sketch seismic instrument 04

c) A refrigerator unit having mass of 35 kg is to be supported on three springs each having a spring stiffness 'K' the unit operates at 480 rpm. Find the value of stiffness if only 10% of the shaking force is allowed to be transmitted in the supporting structure 06

K-2015

ac4fd94faaab640f273021ebf8a54b36