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KERALA AGRICULTURAL UNIVERSITY
B.Tech. (Ag. Engg.) 2017 Admission
I Semester Final Examination-January-2018
Engineering Mechanics (2+1)

Marks: 50
Time: 2 hours

I State True or False

(10x1=10)

- 1 Centre of gravity of a right circular solid cone lies on the vertical axis at a distance of $H/4$
- 2 A symmetrical body is rotating about its axis of symmetry, its moment of inertia about the axis of rotation being 2kgm^2 and its rate of rotation is 2 revolutions/sec. The angular momentum of the body in kgm^2/sec is 8π
- 3 Coefficient of friction depends upon top surface.
- 4 Statics does not deal with the forces required to produce motion.
- 5 S.F is minimum where B.M.is maximum
- 6 One Nm is equal to 1 MW.
- 7 A frame, in which all members does not lie in a single plane is called co-planer
- 8 The compressive longitudinal stress produces tensile lateral strains
- 9 The deformation of a body is not measured in terms of oblique stress
- 10 A force P of 50 N and another force Q of unknown magnitude act at 90° to each other. They are balanced by a force of 130 N.The magnitude of Q is 120 N

II Write Short notes on any FIVE of the following

(5x2=10)

- 1 Write short note on three dimensional stress conditions.
- 2 Differentiate between normal stress and shear stress.
- 3 Define Hook's law
- 4 Define cantilever beam with the help of diagram only.
- 5 State the assumptions made in deriving torsional formula.
- 6 Draw a neat sketch of force component on the simply supported beam with a concentrated load 'P' at the mid span of 'L' m
- 7 Draw a neat labeled sketch of stress strain curve for ductile materials.

III Answer any FIVE of the following.

(5x4=20)

- 1 What do you mean by Poission ratio and hence derive an expression for it.
- 2 A short bar of length 10 cm tapers uniformly from a diameter of 4 cm to a diameter of 3.5 cm and carries an axial load of 140 kN. Find the decrease in length of the bar. Neglect weight of bar and take E as 200GN/m^2 .

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- 3 Discuss Varignon's theorem and its applications.
- 4 A beam is having a length of "L" between the supports and on both sides of supports its having an overhang of "a". At the end of the beam it's subjected to a load of "P" on both sides. Draw shear force diagram and bending moment diagram for an overhanging beam.
- 5 What are various types of load acting on a simply supported beam? Explain with the help of sketch only.
- 6 Define torsional rigidity. Discuss about it in reference to circular shaft.
- 7 A solid steel shaft is subjected to a torque of 40kNm. If the angle of twist is not to exceed half degree per meter length of the shaft and shear stress is not to be allowed to increase beyond 90 MN/m², find suitable diameter of the shaft. Take G= 80 GN/m².

IV Write an essay on any ONE of the following (1x10=10)

- 1 A hollow shaft with inner and outer diameters of 100mm and 150mm is replaced by a solid shaft of same weight. Calculate the torque transmitted by shafts if allowable shear stress is 100 MPa. If the solid shaft is replaced by a hollow shaft of outer diameter of 200 mm, Calculate the torque transmitted for same weight of shafts.
- 2 Derive a relationship between shearing force and intensity of loading along with a relationship between shear force and bending moment.
