

22240

21718

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

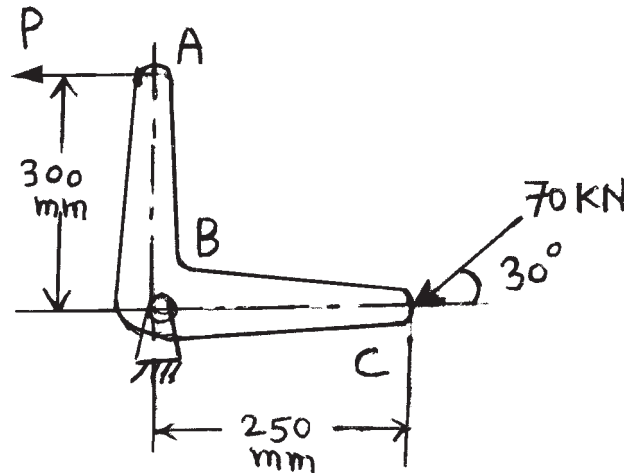
Marks

- 1. Attempt any FIVE of the following:** **10**
- a) State the Lamis Theorem of forces.
 - b) Define mass, weight, inertia and momentum.
 - c) Define Hook's Law and factor of safety.
 - d) State law of machine and explain reversible machine.
 - e) Define coefficient of friction and state two factors affecting on it.
 - f) Why system of code is given to bearings?
 - g) Classify cam and followers.

P.T.O.

2. Attempt any THREE of the following:**12**

- a) State three Newton's laws of motion.
- b) A crank ABC with system of forces acting on it is shown in Figure No. 1. Find the force P.

**Fig. No. 1**

- c) A screw Jack lifts a load of 30 kN by an effort of 400 N applied at the end of lever arm of length 750 mm. If the pitch of screw is 6 mm.

Calculate efficiency of screw jack.

- d) Enlist the types of gears and give particular application of each.

3. Attempt any THREE of the following:**12**

- a) Draw a neat sketch of single purchase crab winch. Name the parts of the machine and write its V.R.
- b) Draw stress-strain curve for brittle material.
- c) A 4m long steel rod must not stretch more than 3mm and the normal stress must not exceed 150 MPa when the rod is subjected to a 10 kN axial load knowing that $E = 200 \text{ GPa}$, determine the required diameter of rod.
- d) Define Isotropic and homogenous material. Give example of it.

- 4. Attempt any THREE of the following:** **12**
- a) Explain different types of bearings and state application of each.
 - b) Explain rated life of bearing with an example.
 - c) A nylon thread is subjected to an 85 N tension force. Knowing that $E = 3.3 \text{ GPa}$ and that the length of the thread increases by 1.1% determine:
 - (i) The diameter of the thread
 - (ii) The stress in the thread
 - d) State the types of lubricants with their properties and application.
 - e) If $P = 200 \text{ N}$, determine the friction developed between 50kg crate and the ground. The coefficient of static friction between the crate and the ground is $\mu = 0.3$.
- 5. Attempt any TWO of the following:** **12**
- a) Explain slider-crank mechanism with sketch.
 - b) Explain work of force and work of couple moment.
 - c) Illustrate bearing selection procedure.
- 6. Attempt any TWO of the following:** **12**
- a) Explain simple, compound and epicyclic gear trains with sketch.
 - b) Explain with neat sketch obtaining stress-strain curve with the help of UTM.
 - c) Differentiate between centrifugal force and centripetal force.
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