

-203-

Total No. of Pages 02

Roll No.....

THIRD SEMESTER

B.Tech. (PE)

SUPPLEMENTARY EXAMINATION February -2019

PE-207 Engineering Analysis and Design

(Modeling and Simulation)

Time: 3:00 Hours

Max. Marks : 40

Note : Answer any five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

- Q.1. (a) Derive an expression for "Torsion"? Also write Assumptions? (4)
- (b) A piston rod of steam engine 80cm long is subjected to a (4)
maximum load of 60 KN. Determine the diameter of the rod
using Rankine's formula with permissible compressive stress
of 100N/mm^2 . Take constant in Rankine formula as $1/7500$
for hinged ends.
- Q.2. (a) A hollow circular bar having outside diameter twice the (4)
inside diameter is used as a beam. From the bending moment
diagram of the beam, it is found that the bar is subjected to a
bending moment of 40kNm . If the allowable bending stress in
the beam is to be limited to 100MN/m^2 , find the inside
diameter of the bar.
- (b) The principal stresses at a point across two perpendicular (4)
planes are 75MN/m^2 (tensile) and 35MN/m^2 (tensile). Find
the normal, tangential and resultant stress and its obliquity on
a plane at 20° with the major principal plane.

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Q.3. (a) A ball of weight 120 N rests in a right angled groove. The sides of the groove are inclined to the angle of 30° and 60° to the horizontal, if all the surfaces are smooth, then determine the reactions at the points of contact? (4)

(b) State and prove Lami's Theorem? (2)

(c) State D'Alembert's principle giving equations expressing the principle for a rigid body in plane motion? (2)

Q.4. (a) What do you mean by Morphology in Design. Discuss its phases in detail. (8)

Q.5. (a) Discuss types of mechanical failure found in components. write details of "corrosion failure". (4)

(b) What role does computer play in product cycle. (4)

Q.6. (a) Define "Communication". How technical information is communicate in product cycle. (4)

(b) Explain the term "Preliminary Need statement". Discuss various factors considered during need analysis. (4)

END