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SF-6431

B. E. - II (Sem. IV) (Chemical) Examination

May / June - 2011

TMME

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 2 (SEM. 4) (CHEMICAL)

Name of the Subject :

☛ TMME

☛ Subject Code No. : 6 4 3 1 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

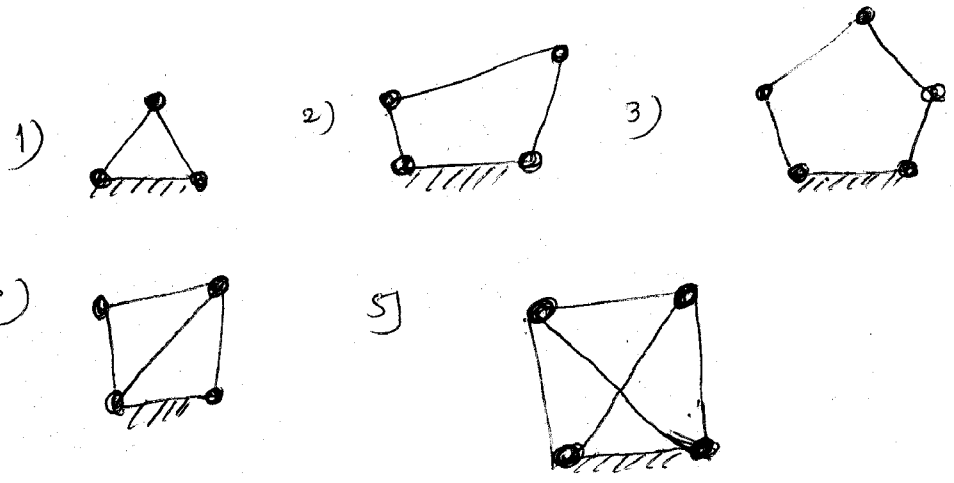
(2) Q.1 and Q.5 are compulsory.

(3) Attempt any 2 questions from Q.2 Q.3 and Q.4 and other any 2 from Q.6, Q.7 and q.8.

(4) Unprogrammable scientific calculator and design data book is permitted.

(5) Assume data, if necessary.

1 Find degree of freedom for following plane mechanism. **10**



2 A cam is to give the following motion to a knife edged follower .: **20**

(i) Outstroke during 60° of cam rotation.

(ii) Dwell for the next 30° of cam rotation.

(iii) Return stroke during next 60° of cam rotation and

(iv) Dwell for the remarriage 210° of cam rotation.

The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when (a) the axis of the follower passes through the axis of the cam shaft, and (b) the axis of the follower is offset by 20 mm from the axis of the cam shaft.

3 (a) Define : **10**

(i) External and internal gearing
(ii) Pitch circle diameter
(iii) Addendum circle
(iv) Deddendum
(v) Diametral pitch

(b) Two spur gears have a velocity ratio of 1/3. The driver gear has 72 teeth of 8 mm module and rotates at 300 rpm. Calculate the number of teeth and the speed of the driver. What will be the pitch line velocities ? **10**

4 (a) Derive the condition for maximum efficiency of a screw jack. **10**

(b) Find the force to be applied at the end of one metre long handle of a screw jack, so that 5 tonne load is lifted with constant velocity. The screw has single start square threads with a pitch of 20 mm. The root diameter is 50 mm coefficient of friction between the screw and nut is 0.15. **10**

5 Attempt the following : **10**

(i) Define :factor of safety.

(ii) What are the types of riveted joints depending upon the way the plates are connected ?

(iii) Write the relation between size of weld and throat of weld in a transverse fillet welded joint.

(iv) Which joint is used to connect piston rod with crosshead in a steam engine ?

(v) Write function of a coupling.

(vi) In a crossed belt drive, the shafts are arranged parallel and rotate in opposite direction. State true or false.

(vii) Define 'module' for a spur gear.

(viii) Define : axial pitch.

(ix) Write the formula to calculate crushing strength (crushing resistance) of a rivet.

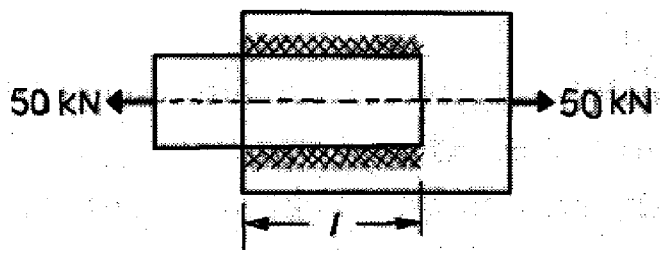
(x) What are the forms of teeth (tooth profiles) used for gears ?

6 (a) Design a cast iron protective type flange coupling to transmit 15 kW at 900 rpm from an electric motor to a compressor. The service factor is 1.35. The following permissible stress may be used : **14**

Shear stress of shaft, bolt and key material = 40 MPa
Crushing stress for bolt and key = 80 MPa
Shear stress for cast iron = 8 MPa
Draw a neat sketch of the coupling

(b) Show that a square key is equally strong in shearing and crushing. **6**

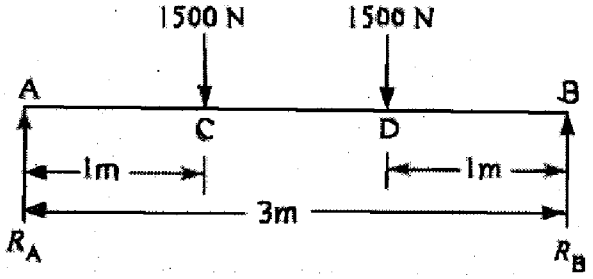
7 (a) A steel plate 100 mm wide and 10 mm thick is welded to another steel plate by means of double parallel fillet welds, as shown in Fig. The plates are subjected to a static tensile force of 50 kN. Determine the required length of the welds, if permissible shear stress in the weld is 94 N/mm^2. **6**



(b) A leather belt 9mm x 250 mm is used to drive a cast iron pulley 900 mm in diameter at 336 rpm. If the active arc on the smaller pulley is 120^o and stress in tight side is 2 MPa, find the power capacity of the belt. The coefficient of friction of leather on cast iron is 0.35. **7**

(c) A pair of straight spur gears is required to reduce the speed from 5000 rpm to 1000 rpm for 12 hours running time per day continuously. The pinion is 0.55% carbon steel hardened and tempered and has 40 teeth. Module 10 mm, face width 100 mm and 20° pressure angle. Determine the kW rating of this gear set. the gear material is C.I. grade 30. **7**

8 (a) A shaft made of mild steel is required to transmit 100 kW at 300 rpm., the supported length of shaft is 3m. It carries two pulleys each weighing 1500 N supported at a distance of 1m from the ends respectively. Assuming the safe value of stress 60 MPa determine the diameter of the shaft. **7**



(b) Draw the socket and spigot cotter joint and explain any six modes of failure of this joint. **13**
