B.TECH SEM – IV (2007 COURSE) (MECHANICAL ENGG.) :
SUMMER - 2018
SUBJECT: THEORY OF MACHINE-I*

Day: **Thursday**
Date: **07/06/2018**

Time: **10.00 AM TO 02.00 PM**
Max Marks.80

S-2018-2632

N.B. :

1) **Q. No. 1** and **Q. No. 5** are **COMPULSORY**. Out of remaining attempt **ANY TWO** questions from each section.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Assume suitable data, if necessary.
4) Answer to both the sections should be written in **SEPARATE** answer book.

SECTION-I

Q.1 **a)** Give the classification of kinematic chain. **(05)**

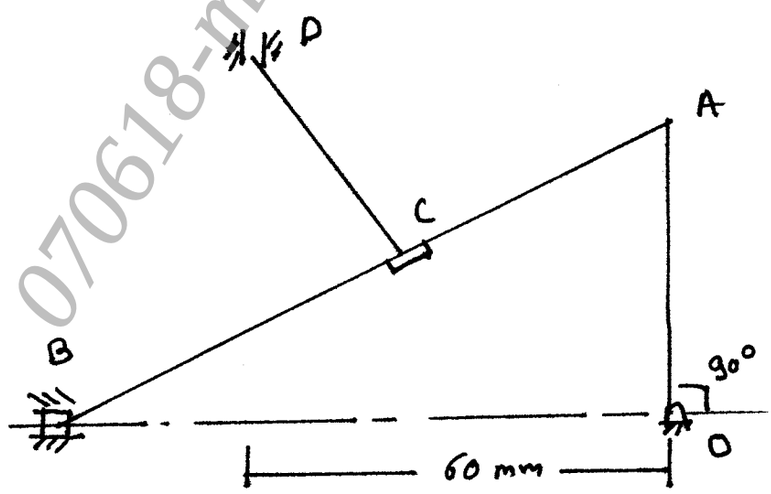
b) Write short note on Escapement mechanism. **(05)**

c) Define " Body centrode" and " Space centrode" **(04)**

Q.2 **a)** Write short note on **(07)**
i) Constrained motion.
ii) Compound chain.

b) What is an exact straight line motion mechanism and explain peaucelliers straight line motion mechanism with neat sketch. **(06)**

Q.3 **a)** Figure shows a mechanism in which crank OA is rotating anticlockwise at 20 rad/sec. At the instant shown. Find out the velocity and acceleration of sliders B and D as well as the angular acceleration of link AB using relative method (use scale 1 mm = 10 mm/s for velocity polygon and 1 mm = 200 mm/s^2 for acceleration polygon. Link lengths are OA = 40 mm, AB = 90 mm, AC = 30 mm and CD = 50 mm **(13)**



Q.4 **a)** A universal coupling is used to connect two shafts whose axes intersect at 160^0. The driving shaft rotates uniformly at 300 r.p.m. The driven shaft operates against a steady torque of 200 N-m and carries a rotor whose mass is 22 kg and a radius of gyration of 150 mm. What is the maximum value of the torque which must be exerted by the driving shaft? **(13)**

P.T.O.

SECTION-II

Q.5 **a)** Explain complex number method of acceleration analysis. **(05)**

b) State and explain three string torsional pendulum. **(05)**

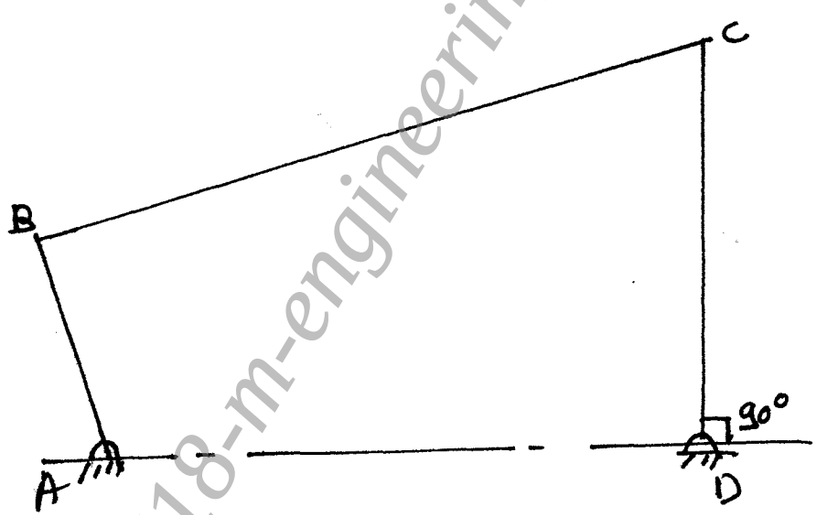
c) Derive loop closure equation for four bar chain mechanism. **(04)**

Q.6 **a)** The obliquity ratio of a vertical reciprocating engine is 4.5, The engine bore and stroke is 75 mm and 90 mm respectively. The mass of reciprocating part is 1.2 kg. The gas pressure intensity is 5.5 bar when it has moved 50^0 from the IDC on its power stroke. Determine **(13)**

i) The piston effort.
ii) Net load on gudgeon pin and the crank pin.
iii) Thrust in cylinder walls.
iv) Thrust on crank bearing.

Q.7 **a)** Explain the concept of two point mass dynamically equivalent system. **(13)**

Q.8 **a)** The four bar mechanism ABCD is shown in figure, which is driven by link 2 at 45 rad/sec counter clockwise. Find the angular velocity of link 3 and 4 by using complex number method. Link lengths are AB = 100 mm, CD = 300 mm and AD = 250 mm. **(13)**



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