MENOUFIA UNIVERSITY
FACULTY OF ENGINEERING
SHEBIN ELKOM
SECOND SEMESTER EXAMINATION
ACADEMIC YEAR:- 2015/2016

DEPARTMENT:PROD.ENG.&MECH.DESIGN
YEAR:- FIRST (MCHANICAL POWER)
SUBJECT/CODE:THEO.OF MACH./ PRE126
TIME ALLOWED: 3 HOURS
DATE:- 5/6/2016

This exam measures the following ILOs(a_4,a_{13},a_{19},b_2,b_{17},c_7)

ANSWER THE FOLLOWING QUESTIONS :- (85 MARKS) (MARKS)

Question No. 1 :- (25)

A –In the mechanism shown in Fig.1, the driver link AB rotates with constant angular speed of 150 rpm unti-clockwise direction. Determine, for $\phi=45^{\circ}$, the velocity and acceleration of the block E (link 6), if the dimentions of the mechanism are: AB= 160 mm, AC= 200 mm, CD= 150 mm, and DE= 320 mm . (15)

B - If the driving torque that acting on the link AB is T= 100 N.m, find the horizontal force P On the Link 6 to maintain the mechanism in static equilibrium. (10)

Question No. 2 :- (20)

A- Explain the function of a flywheel in a machine ? And also explain briefly the difference between the static and dynamic force ? (4)

B- A machine shaft running at a mean speed of 250 rpm. requires a torque which increases uniformly from 1200 N.m to 3600 N.m during the first half-revolution, remains constant for the following half-revolution, decrease uniformly to 1200 N.m during the next half-revolution and then remains constant again for the next half-revolution, this cycle being repeated. It is driven by a motor which exerts a constant torque and has a rotor weighing 3000 N with a radius of gyration of 0.4 m. If in addition a flywheel with a weight of 2500 N and with a radius of gyration of 0.5 m is fitted to the shaft , determine:-

i – The percentage fluctuation of speed during the cycle, and

ii - The required horse power of the motor. (16)

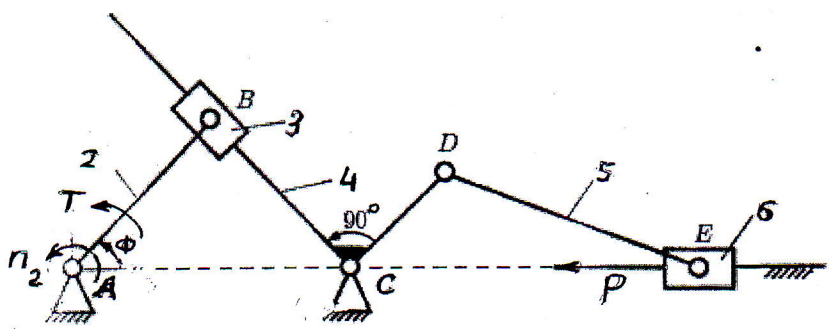

Fig.1

Please see page no. 2

Question No. 3 :- **(20)**

A – Two gear wheels of module pitch 5 mm have 40 and 60 teeth respectively. The pressure angle is 20° and each wheel has a standard addendum of one module . Find the length of the path of contact and the maximum sliding velocity, if the angular velocity of the smaller wheel is 150 rpm. (8)

B - In the epycyclic gear train shown in Fig.2, The wheel D is held stationary be the shaft A and the arm B is rotated at 120 rpm. The wheel E (20 teeth) and F (40 teeth) are fixed together and rotate freely on the pin carried by the arm. The wheel G (30 teeth) is rigidly attached to the shaft C. The planet wheel F mesh with the annular gear H that rotate freely independently on the shaft C. Find the speed of the shaft C and the speed of the annular gear H when the shaft A is held stationary. (12)

Question No. 4 :- **(20)**

A - Explain with sketches the follower configurations ? (5)

B - The following data is provided for a disk cam rotating clockwise at uniform speed:-

. The rise, upper dwell, and return angles are 120°, 60° and 120° degree respectively.

. The base circle radius is 30 mm.

. The motion during the rise and during the return are both simple harmonic motion.

Draw the cam profile for translating flate-faced follower during 40 mm height. Also determine the maximum acceleration of the follower when the cam rotates at 150 rpm, and draw the displacement, velocity and acceleration diagrams for one complete revolution of the cam. (15)

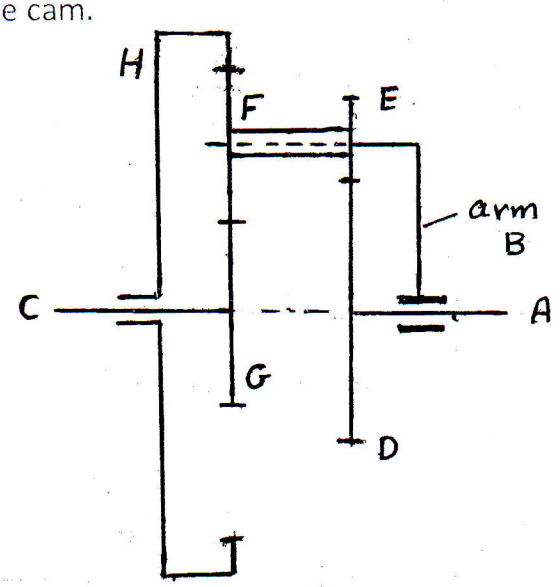

Fig. 2

Pr.Dr. S. Ghoeam

GOOD LUCK

With our best wishes

Dr.R. Aouelnasr

This exam measures the following ILOs			
Question Number			
Skills	Knowledge &Understanding Skills	Intellectual Skills	Professional Skills