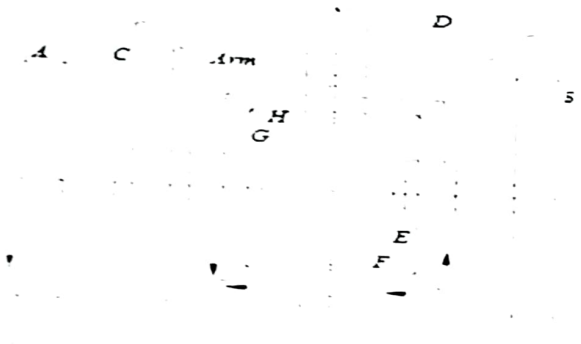
UNIVERSITY INSTITUTE OF ENGG & TECH, PANJAB UNIVERSITY

Subject: Theory of Machines II, Time: 90 Minutes Max Marks: 30

1. Each wheel of a four wheeled rear engine automobile has a moment of inertia of 2.4kg.m^2 and an effective diameter of 660 mm. The rotating parts of the engine have a moment of inertia of 1.2kg.m^2. The gear ratio of engine to the back wheel is 3 to 1. The engine axis is parallel to the rear axle and the crankshaft rotates in the same sense as the road wheels. The mass of the vehicle is 2200 kg and the centre of the mass is 550 mm above the road level. The track width of the vehicle is 1.5 m. determine the limiting speed of the vehicle around a curve with 80 m radius so that all the four wheels maintain contact with the road surfaces. ***(8)***

2. The gear train shown in figure below is used in an indexing mechanism of amilling machine. The drive is from gear wheels *A* and *B* to the bevel gear wheel *D* through the gear train. The table gives the number of teeth on each gear. (9)



Gear	A	B	C	D	E	F
Numberof teeth	72	72	60	30	28	24
Diametral Pitch (mm)	08	08	12	12	08	08

Howmanyrevolutions does D makes for onerevolution ofA under thefollowingsituations

a. If *A*and *B*arehavingthe samespeedandsamedirection
b. If *A*and*B*arehavingthe samespeedandoppositedirection
c. If *A*is making72rpm and *B*is atrest
d. If *A*ismaking72rpmand*B*36rpmin thesamedirection

3. Find (i) moment of inertia of a connecting rod about an axis through C.G.and (ii) the distance of its C.G. from the small end centre if this connecting rod of mass 60 kg and of length 1m between centres, is suspended vertically. The rod makes 100 oscillations in189 seconds when suspended through the centre of small end, and 162 seconds when suspended through big end centre. ***(7)***

4. (i) State and derive law of gearing. (ii) Drive an expression for minimum number of teeth on pinion to avoid interference. ***(6)***

OR

What do you mean by steering gear mechanism? Explain any one type of steering gear in details.