Mansoura University	Final 2nd, Semester, Exam on **Tractors and Farm Power units** الجرارات والقوى الزراعية For Third Level Students	Faculty of Agriculture
Total Marks :- (60)	Agric. And Biosystems Eng. Program	Agric. Eng. Department
Time : 2 Hours	Course Code (Unv.323)	Date :- 28 / 6 / 2012

Please Answer the following questions:-

First Question (19 Marks)

1- List out to illustrate the following:- (10 Marks)

1	The different sources of farm power	2	Types of gears used in tractors
3	Types of manual transmission gearboxes	4	The considerations of tractor classification
5	Parameters affecting the power source applications		

2- Differentiate between each of the following:- (9 Marks)

1	Belt drive and chain drive.	2	Traction efficiency and coefficient of traction
3	The torque capacity of clutch plates with uniform pressure and with uniform wear.		

Second Question (10 Marks)

Draw a neat sketch to indicate each of the following:-

1	The components of hydraulic clutch	2	The cog belt construction
3	The traction power transmission system for both wheel and crawler tractors		

Third Question (10 Marks)

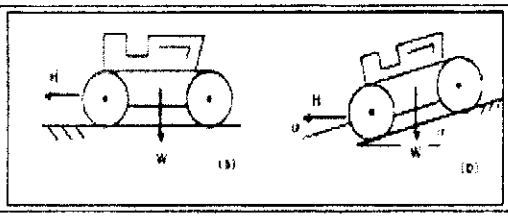
Write the proper equations for estimating each of the following:-

1	The angular velocity of the belt drive	2	The depreciation of tractor per year
3	length of open belt and crossed belt drive.	4	The overall efficiency for the tractor
5	The soil reaction (H) on the wheel considering ideal analysis(without losses)		

Fourth Question (21 Marks)

(1) A rubber wheel tractor as shown in the following figure is standing (a) on level ground and (b) on a slope. The following data apply:

Wheel - soil contact length	L	= 1.2 m
Wheel width (total for two)	b	= 0.6 m
Tractor mass	W	= 2.4 T
Soil cohesion	c	= 15 kPa
Soil angle of internal friction	ϕ	= 30^0
Angle of slope	α	= 15^0



Estimate the capacity, H, of the tractor as an anchor and the gross tractive coefficient, Ψ; assume that the normal stress under the wheels is uniform.

(2) A tractor was tested on a field within a time t = 25.8 sec, and gave the following data:-Engine power = 62.1 kW, Distance, no-load mo = 55.8 m, Distance, load m = 46.2 m, Rear wheel weight Wr = 3900 kg_f, Drawbar pull P = 26.2 kN. Assuming transmission efficiency ηr = 0.9. Determine the wheel slip%, travel speed, drawbar power, and tractive efficiency.

(3) One of the planetary gear sets has a ring gear with 72 teeth and a sun gear with 30 teeth. Estimate the different gear ratios out of this gear set as sun gear is held stationary, and also, as locking planet carrier and ring gear together.

End of questions. Wish You Good Luck ;;;;

Prof. Dr. A.E. Abou El-Magd