Mansoura University	Final 2nd, Semester, Exam on الجرارات والقوى الزراعية **Tractors and Farm Power units**	Faculty of Agriculture
Total Marks :- (60)	Third Level Students of Agric. And Biosystems Eng. Program .....Course Code (Eng.323)	Agric. Eng. Department
Time : 2 Hours		1 / 6 / 2017

Please answer the following questions:-

First Question (17 marks)

(A) Mention the main functions for each of the following:- (1 mark for each)

1- The clutches? 2- The gearboxes? 3 - The differential unit?
4- The planet gear carrier? 5 - The collar rings in constant-mesh transmission?

(B) List out the various parameters governed the values of each of the following: - (2marks for each)

1.The available power from draft animals 2. The fuel equivalent power
3. A solar cell's conversion efficiency 4.The available energy from a biogas production unit
5. Weight transfer between tractor's wheels 6.The power produced from a water fall

Second Question (5 marks)

Put (√) *or* false (×) and rewrite the incorrect portions in each of the following:- (1 mark for each)

(1)Energy generating efficiencies are considered as 70, and 80 % for wind mill, and biogas unit respectively.
(2)The amount of power being transmitted by belt drives is larger than that of chain drives.
(3) Drawbar power to tractor engine power ratio ≥ PTO power to tractor engine power ratio.
(4)Traction efficiency is ratio of two forces whereas traction coefficient refers to conversion of energy.
(5)The maximum pull of the same tractor is doubled by reducing ⅓ height of drawbar pull.

Third Question (20 marks)

Describe using neat drawing sketches to indicate each of the following:- (4 marks for each)

(1) The experimentally methods used to locate the tractor center of gravity (CG)?
(2) The working principles of the overrunning clutch
(3) Various parameters affecting on the tractor stability as it is making a short turn.
(4) The practical steps to determine rolling resistance of a wheel tractor
(5) The working principles of the hydrostatic type transmission

Fourth Question (18 Marks)

(1) Compare the horse power capacity of a disk clutch and cone clutches, knowing that the first has 5 steel disks and 4 bronze disks, while the second cone has a pitch cone angle of 10^0. Assume that both clutches rotate at the same rpm, and has the same mean radius, axial forces, coefficients of friction..... (4 Marks)

(2) A tractor was tested under 4 different drawbar pulls of (0,4, 8, and 12 KN), and gave the following data:-

Test No	Used engine power (kW)	Drawbar power (kW)	Power lost in slippage (kW)	Power lost in transmission (kW)	Power lost in rolling resistance (kW)
1	9	---------	---------	4	5
2	18.5	9	---------	4	4
3	28.5	15.5	7	---------	---------
4	---------	5.5	22	4	1.5

Assume that engine efficiency is constant as (30%) for all tests then answer on the following:- (14 Marks)

(a) Find the missed values in the above table? ..... (3 Marks)
(b)Compute the overall tractor power efficiency in each test? ..... (5 Marks)
(c) Draw a graphical relationship between drawbar pulls and engine power distributions for these tests?

End of questions; Wish You Good Luck;

Prof. Dr. A.E. Abou Elmagd; + Exam Committee