| Mansoura University | Final 2nd, Semester, Exam on<br>الجرارات والقوى الزراعية<br>**Tractors and Farm Power units**<br>For Third Level Students | Faculty of Agriculture |
|---|---|---|
| Total Marks :- (60) | Agric. And Biosystems Eng. Program<br>Course Code (Eng.323) | Agric. Eng. Department |
| Time : 2 Hours | | Date :- 15 / 6 / 2016 |

*Please answer the following questions:-*

## *Question No.1 (18 Marks)*

Mention factors that affect the amount of each of the following: (3 Marks for each)

| | | |
|---|---|---|
| 1- Maximum drawbar pull | 2- Power lost in a wheel rolling resistance | 3- Tractor wheel's slip |
| 4-Tractor stability factors | 5-Speed ratio of a planetary gear-set | 6- Wind turbine's power |

## *Question No.2 (18 Marks)*

Draw a neat sketch to indicate each of the following:- (6 Marks for each)

| | | | |
|---|---|---|---|
| 1 | The components of a differential unit | 2 | The pair of friction surfaces for a single and a double disk clutches |
| 3 | The power train of a crawler tractors | | |

## *Question No.3 (24Marks) .....(6 Marks for each)*

(1) If the clutch shown at fig (1) rotates at 2000 rpm, compute its power capacity, considering axial force of 2000 N, coefficient of friction of 0.25, and mean friction radius of 5 cm were used.

(2) Use the data shown in fig (2), and assume drawbar height of 40 cm to calculate the weight transfer, and stability factor of that tractor as it operates on a slope with inclined angle of $30^0$.

(3) Use the graphical relationships shown at figure (2), and at drawbar pull of 9 KN, to compute the overall tractor power transmission efficiency, considering engine efficiency value of 30%.

(4) Determine the ground speed (in km/h) and the maximum axle torque on the rear wheels for the tractor shown at figure (4) knowing that the engine is delivering 50 Kw at 1300 rpm to the gearbox and the speed ratio were as follows: - (N1 / N2=12); (N2 / N3=4 ) ;and (N3 / N4 =2).

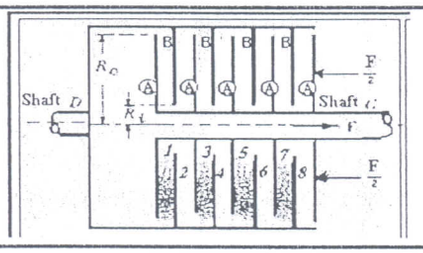


Figure (1)

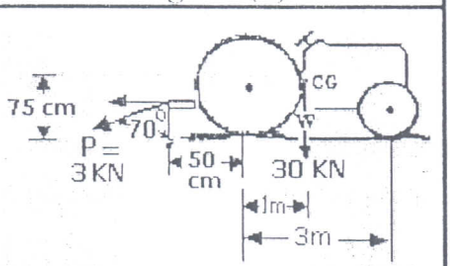


Figure (2)

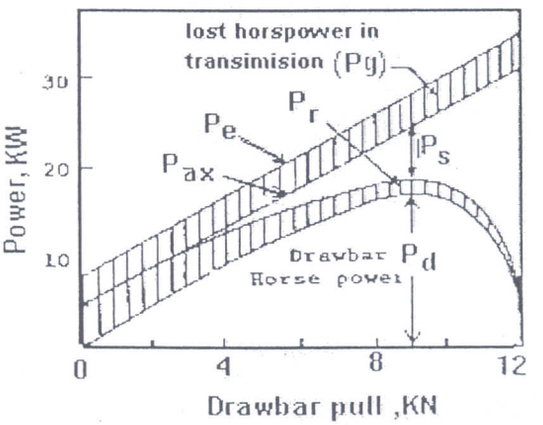


Figure (3)

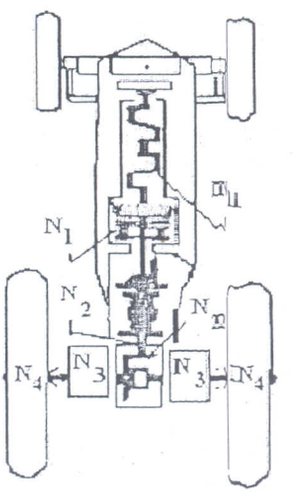


Figure (4)

Wish You Good Luck;

*Prof. Dr. A.E. Abou El-Magd + Exam. Committee*