KERALA AGRICULTURAL UNIVERSITY

B.Tech.(Ag. Engg.) 2016 Admission

V Semester Final Examination-January 2019

Fpme.3109 **Tractor Systems and Controls (2+1)**

Marks: 50

Time: 2 hours

I **Choose the Correct Answer** **(10x1=10)**

1 Ballast are sometimes used on front tyres of a four wheel tractor to

a) Increase stability b) Increase traction

c) Decrease front wheel slippage d) Decrease tractor vibration

2 Weight transfer in a tractor implement system is caused by

a) Weight of operator b) Traction force c) Tractor slip d) Application of pull

3 In comparison to steel wheels, pneumatic wheels have the advantage of

a) Less power required for the same load b) Less fuel consumption

c) Decreased rolling resistance d) All of the above

4 Methods for determining centre of gravity of the tractor

a) Weighing method b) Balancing method c) Suspension method d) All the above

5 Complete path of power from engine to wheel is called

a) Power system b) Gear unit c) Power train d) None of the above

State True /False

6 Mufflers are provided to control vibration.

7 A differential in a tractor is provided to work as compensating device on turns.

8 Anthropometer is an instrument used for measurement of human body in standing posture.

Define the following

9 Tractor

10 Ergonomics

II **Write Short notes on any FIVE of the following** **(5x2=10)**

1 Weight transfer in a tractor.

2 Advantages of using Planetary gear train.

3 Show the main forces acting on a tractor during field operation with a sketch.

4 Rolling resistance and its mathematical formula.

5 Steering geometry.

6 Importance of differential lock in tractor system.

7 List down any five anthropometric dimensions of the human body useful in tractor designing.

III **Answer any FIVE of the following.** **(5x4=20)**

1 Tractor hydraulic (ADDC) system, its components and functions with sketch.

2 How traction of a tractor can be increased under dry land and wet land cultivation?

3 Various tractor power outlets with their relevant specifications / details.

4 Describe working of a tractor brake system with a sketch.

5 Trouble shooting of a tractor power transmission system.

P.T.O

6 A rear wheel drive tractor with a total weight of 23 kN has a wheel base of 2100 mm and CG is 710 mm ahead of rear axle centre line. The tractor is pulling a level drawbar pull of 15 kN on a concrete surface at a forward speed of 6 kmph. The drawbar height is 485 mm. The axle power is 33.3 kW. Determine

a) Weight transfer on rear axle

b) Coefficient of traction and

c) Tractive efficiency (ignore slip).

7 A rear wheel drive tractor weight 18 kN has the static weight divided in such a way that 12 kN is on the rear wheels and 6 kN on the front wheels. The tractor is pulling a plough at a forward speed of 5 kmph. The plough exerts an inclined drawbar pull of 10 kN with the line of pull making an angle of 15^0 with the horizontal. The axle power required is 20 kW. The wheel base of the tractor is 2100 mm and hitch height is 500 mm. Find the dynamic weight on the rear axle and tractive efficiency of the tractor.

IV **Answer any ONE of the following** **(1x10=10)**

1 Ergonomic considerations and operational safety in tractor.

2 Recent developments in the design of various tractor systems and controls.

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