KERALA AGRICULTURAL UNIVERSITY
B.Tech. (Agrl. Engg.) 2020 Admission
V Semester Final Examination – January 2023

Fpme.3109 **Tractor Systems and Controls (2+1)** **Marks: 50**
Time: 2 hours

I **Match the following** **(10x1=10)**

	A	B
1.	Hydraulic system	Engine
2.	SAE20W-40	Gear box
3.	Ackerman	Steering
4.	SAE80W-90	Pascal's law
5.	Pressure plate	Clutch

State True or False

6. Constant mesh gearbox is better than sliding mesh gearbox.
7. Differential provides higher rpm to a wheel that is difficult to rotate.
8. Center of gravity of tractor is at its geometric center.
9. Generally, Gearbox is used to reduce the transmitted rpm from engine in a tractor.
10. Constant draft can be maintained by maintaining constant depth.

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

1. Define final drive. Different types of final drive
2. Write 4 important parts of mechanical steering system of a wheeled tractor.
3. What is weight transfer in case of an agricultural tractor?
4. Draw flow chart of power train of tractor.
5. Define caster angle and camber angle in case of a tractor.
6. Why differential lock is provided in a tractor?
7. Name 4 power outlets of an agricultural tractor.

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

1. How center of gravity of a tractor can be determined? Describe any one method.
2. Describe working of hydraulic steering system of a tractor with diagram.
3. Draw a clear diagram of differential showing different components.
4. What are different types of braking system? Describe working of an internal expanding type braking system.
5. Describe Automatic Depth and Draft Control system of an agricultural tractor.
6. Define the following in case of a tractor:
   (a) Wheel base
   (b) Track width
   (c) ground clearance
   (d) turning radius
   (e) clearance radius
7. Write down parameters to specify a tractor.

IV **Write an essay on ANY ONE of the following** **(1x10=10)**

1. Find the conditions for maximum possible pull for a tractor avoiding overturning
   Assume:
   - W= Weight of tractor
   - A= Point of ground contact of rear wheel of the tractor
   - X_1= Distance of CG of tractor from point A
   - X_2= Wheel base (distance of point A from point of ground contact of front wheel)
   - P= Pull acting at an angle Θ to horizontal, at a height Y and distance S rear to point A
2. (i) Describe the basic principle of operation of hydraulic system.
   (ii) Write about different components and their working in tractor hydraulic system.

****