O.P.Code: 20AG0727 | R20 | H.T.No. | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. IV Year I Semester Regular & Supplementary Examinations October/November-2025
TRACTOR DESIGN AND TESTING
(Agricultural Engineering)

Time: 3 Hours **Max. Marks: 60**

(Answer all Five Units **5 x 12** = **60** Marks)

UNIT-I

1	a	Explain the parameters to be considered in the design of agricultural tractors.	CO1	L2	6M
	b	A 2-wheel drive tractor weighs 24 kN. The distance between the front and rear axle is 2.2 m. The center of gravity (CG) is located 0.9 m behind the front axle. Find the weight on the front and rear axles.	CO1	L4	6M
		OR			
2	a	Explain about weight transfer phenomenon in tractors.	CO1	L2	6M
	b	Explain about static equilibrium of tractor with neat sketch.	CO1	L2	6M

UNIT-II

3	a	Explain the traction theory and factors affecting tractive efficiency of tractors.	CO2	L2	6M
	b	Differentiate between single-disc and multi-disc clutches with neat sketches.	CO2	L2	6M
		OR			
4	a	What are the design considerations for gearbox of a tractor.	CO2	L2	6M
	b	A single plate clutch, with both sides effective, has outer and inner diameters 300 mm and 200 mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 0.1 N/mm2. If the coefficient of friction is 0.3, determine the power transmitted by a clutch at a speed 2500 r.p.m.	CO2	L4	6M

UNIT-III

5	a	Define a steering system. Discuss the qualities of a good steering system for tractors.	CO3	L1	6M
	b	Explain the design and working of Ackerman steering geometry.	CO3	L2	6M
		OR			
6	a	A tractor has a wheelbase of 2.0 m and a track width of 1.2 m. The inner wheel is to turn at 40°. Find the outer wheel angle for the true rolling condition using Ackerman steering.	CO3	L4	6M
	b	Explain about actuators in the power steering system.	CO3	L2	6M

UNIT-IV

7	a	Explain the working principle of a hydraulic system used in tractors.	CO4	L2	6M
	b	A four-stroke cycle diesel engine of a tractor is developing a mean effective pressure of 10 bars. It develops a power of 25 kW while running at a speed of 2200 rpm. Take stroke bore ratio as 1.2; calculate the bore and stroke of engine.	CO4	L4	6M
		OR			
8	a	Explain the different types of hydraulic valves used in tractor hydraulic systems.	CO4	L2	6M
	b	Discuss the design and function of crankshafts and cylinders in tractor engines.	CO4	L2	6M

UNIT-V

9	a	Explain the working principle of position and draft control systems in tractors.	CO5	L2	6M
	b	Discuss the types of tractor engine tests conducted in India.	CO5	L2	6M
		OR			
10	a	Draw and explain a typical engine performance curve.	CO5	L2	6M
	b	A tractor engine develops a torque of 450 N·m at 1800 rpm. Find the brake power using a dynamometer.	CO5	L2	6M

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