

**SRM VALLIAMMAI ENGINEERING COLLEGE**  
**(An Autonomous Institutions)**

SRM Nagar, Kattankulathur – 603 203

**DEPARTMENT OF AGRICULTURAL ENGINEERING**  
**QUESTION BANK**



**IV SEMESTER**

**AG3461 – TRACTORS AND FARM ENGINES**

**Regulation–2023**

**Academic Year 2025-2026 (Even Semester)**

*Prepared by*

**Ms.Dhivya P, Assistant Professor / AGRI**



**SRM VALLIAMMAI ENGINEERING COLLEGE**  
**(An Autonomous Institutions)**  
**SRM Nagar, Kattankulathur – 603 203**



**DEPARTMENT OF AGRICULTURAL ENGINEERING**

**QUESTION BANK**

**SUBJECT NAME : TRACTORS AND FARM ENGINES**

**Sem / Year: IV / II**

<b>UNIT 1: TRACTORS</b>			
Sources of farm power-Classification of tractors - Tractor engines – Types- CI and SI engines, operating principles and function- two stroke and four stroke engine, Comparison - construction of engine blocks, cylinder head and crankcase - features of cylinder, piston, connecting rod and crankshaft – firing order combustion chambers.			
<b><u>PART-A</u></b>			
<b>Q.No.</b>	<b>Questions</b>	<b>BT Level</b>	<b>Competence</b>
1.	Define farm power and list any two traditional sources of farm power.	BT-1	Remembering
2.	Classify tractors based on the purpose of use.	BT-2	Understanding
3.	Differentiate between wheel tractors and crawler tractors.	BT-1	Remembering
4.	What is tractive efficiency?	BT-1	Remembering
5.	Define SI engine and mention its main fuel.	BT-2	Understanding
6.	Define CI engine and state why it is commonly used in tractors.	BT-1	Remembering
7.	Give any two differences between two-stroke and four-stroke engines.	BT-1	Remembering
8.	What is the importance of the compression stroke in an IC engine?	BT-2	Understanding
9.	Define engine block and state its primary function.	BT-1	Remembering
10.	What is a cylinder liner? Mention its purpose.	BT-1	Remembering
11.	List any two materials used for manufacturing tractor engine pistons.	BT-2	Understanding
12.	Write two functions of piston rings.	BT-2	Understanding
13.	What is the purpose of the connecting rod in an engine?	BT-1	Remembering
14.	Define crankshaft and mention its function.	BT-1	Remembering
15.	State any two functions of the crankcase.	BT-1	Remembering
16.	List any two types of combustion chambers used in CI engines.	BT-2	Understanding
17.	Define firing order and give the firing order of a 4-cylinder tractor engine.	BT-1	Remembering
18.	Why is correct firing order essential?	BT-1	Remembering
19.	What is a cylinder head? Mention its function.	BT-2	Understanding
20.	State any two components mounted on the cylinder head.	BT-1	Remembering
21.	What is a gudgeon pin (wrist pin)? Mention its function.	BT-1	Remembering
22.	What is meant by bore and stroke of an engine?	BT-2	Understanding
23.	State any two reasons why diesel engines have higher compression ratio.	BT-2	Understanding
24.	What is valve timing?	BT-1	Remembering
25.	State any two advantages of overhead valve (OHV) engine construction.	BT-2	Understanding

<b><u>PART-B</u></b>			
<b>Q.No</b>	<b>Questions</b>	<b>BT Level</b>	<b>Competence</b>

1.	Explain the various sources of farm power in detail. Discuss their advantages, limitations and suitability for Indian farming conditions.	BT-4	Analyzing
2.	Classify tractors based on function, construction and drive. Explain each type with suitable examples and applications.	BT-3	Applying
3.	Describe the constructional features of a tractor engine block, cylinder, cylinder head and crankcase with neat sketches.	BT-3	Applying
4.	Explain the working principles of SI (Spark Ignition) and CI (Compression Ignition) engines. Compare their performance and applications in agricultural machinery.	BT-4	Analyzing
5.	With neat sketches, explain the working of a four-stroke petrol engine and a four-stroke diesel engine. Compare their strengths and limitations.	BT-3	Applying
6.	Describe the working of a two-stroke engine with neat diagrams. Compare two-stroke and four-stroke engines in terms of construction, performance and applications.	BT-4	Analyzing
7.	Explain in detail the construction, materials used, functions and common defects of the following engine parts: (a)Piston (b)Piston rings (c)Gudgeon pin (d) Connecting rod	BT-3	Applying
8.	Discuss the construction and working of the crankshaft and crankcase. Explain the forces acting on the crankshaft in an IC engine.	BT-5	Evaluating
9.	Explain combustion chambers used in CI engines. Discuss the design, working and suitability of open and divided combustion chambers.	BT-5	Evaluating
10.	Describe the firing order in multi-cylinder engines. Explain the need, factors influencing selection and effects of incorrect firing order.	BT-4	Analyzing
11.	Explain the valve mechanism of a four-stroke engine. Discuss valve timing, valve lead, valve lag, overlap and their significance.	BT-4	Analyzing
12.	Explain the cooling systems used in tractor engines. Describe air-cooling and water-cooling systems with merits and demerits.	BT-3	Applying
13.	Describe the lubrication system of a diesel tractor engine. Explain splash lubrication, pressure lubrication and combined lubrication systems with diagrams.	BT-4	Analyzing
14.	Discuss the different types of cylinders, liners and their constructional features. Explain dry liners, wet liners and their advantages.	BT-4	Analyzing
15.	Explain power transmission in tractors from the engine to the wheels. Describe clutch, gearbox, differential and final drive working.	BT-3	Applying
16.	Explain the performance parameters of tractor engines. Describe indicated power, brake power, friction power, mechanical efficiency, torque and specific fuel consumption.	BT-3	Applying
17.	A three cylinder 4-stroke engine develops 32 bhp, when the cylinderbore is 9 cm, stroke = 12.5 cm, compression ratio = 16.5: 1, engine speed = 2000 rpm and mechanical efficiency = 80%. Calculate (i) Piston displacement (ii) Displacement volume (iii)Piston speed (iv)Stroke-bore ratio (v)BMEP (vi)IHP (vii) FHP	BT-5	Evaluating

## UNIT-II: ENGINE SYSTEMS

Valve system, Valves-inlet and outlet valves – valve timing diagram. Air cleaner, types and performance characteristics- exhaust – silencer. Cooling systems - lubricating systems - fuel injection system, injection pump, types, working principle- Nozzles, types and working principles – governor types and characteristics- electrical system.

### PART-A

Q.No.	Questions	BT Level	Competence
1.	Define valve system and state its function in an IC engine.	BT-2	Understanding
2.	Differentiate between inlet valve and exhaust valve.	BT-2	Understanding
3.	What is a valve timing diagram? Why is it needed?	BT-2	Understanding
4.	Define valve lead and valve lag.	BT-2	Understanding
5.	What is valve overlap and mention its advantage.	BT-1	Remembering
6.	List any two types of air cleaners used in tractor engines.	BT-2	Understanding
7.	Define air cleaner efficiency and write its formula.	BT-2	Understanding
8.	What is the function of an exhaust manifold?	BT-2	Understanding
9.	State any two purposes of a silencer in an engine exhaust system.	BT-1	Remembering
10.	List any two types of silencers used in IC engines.	BT-1	Remembering
11.	What is the function of a cooling system?	BT-2	Understanding
12.	Differentiate between air cooling and water cooling systems.	BT-2	Understanding
13.	List any two components of a water-cooling system.	BT-1	Remembering
14.	What is lubricating oil viscosity?	BT-2	Understanding
15.	List any two functions of the lubrication system in an engine.	BT-2	Understanding
16.	What is a fuel injection system?	BT-2	Understanding
17.	List any two types of fuel injection pumps used in CI engines.	BT-2	Understanding
18.	What is the working principle of a jerk-type (plunger) injection pump?	BT-1	Remembering
19.	Define fuel atomization in diesel injectors.	BT-2	Understanding
20.	List any two types of injector nozzles used in CI engines.	BT-1	Remembering
21.	What is the function of a pintle nozzle?	BT-1	Remembering
22.	Define governor and state its purpose in diesel engines.	BT-1	Remembering
23.	List any two types of governors used in IC engines.	BT-1	Remembering
24.	What is meant by governor characteristics?	BT-2	Understanding
25.	List any two major components of the electrical system of engine.	BT-1	Remembering

### **PART-B**

Q.No	Questions	BT Level	Competence
1.	Explain the valve system in IC engines with neat sketches. Discuss the construction, types, materials, and functions of inlet and exhaust valves.	BT-4	Understanding
2.	Draw and explain the valve timing diagram for a four-stroke diesel engine. Discuss valve lead, valve lag, and valve overlap and their effects on engine performance.	BT-4	Analyzing
3.	Describe the different types of air cleaners used in tractor engines. Explain their construction, working principles, advantages, and performance characteristics.	BT-3	Applying
4.	Discuss the performance characteristics of air cleaners. Explain the terms: dust holding capacity, pressure drop, filtration efficiency, and maintenance aspects.	BT-4	Analyzing

5.	Explain the exhaust system of a diesel engine. Describe the types of silencers and their working principles with neat diagrams.	BT-4	Analyzing
6.	Describe in detail the cooling systems used in IC engines. Explain air cooling and water cooling systems, components, working, advantages, and limitations.	BT-3	Applying
7.	With neat sketches, explain the water-cooling system in tractors. Discuss radiator, thermostat valve, pump, fan, coolant flow, and temperature regulation.	BT-3	Applying
8.	Explain the lubrication system of IC engines with neat diagrams. Compare wet sump and dry sump systems and discuss the properties of lubricating oils.	BT-4	Analyzing
9.	Discuss the types and functions of lubricants. Explain lubrication mechanisms (boundary, hydrodynamic, mixed film) and additives used in engine oils.	BT-4	Analyzing
10.	Describe the fuel injection system of a CI engine. Explain the requirements of an ideal injection system and compare air injection vs. solid injection systems.	BT-4	Analyzing
11.	Explain the working of different types of fuel injection pumps. Describe the plunger (jerk) pump, distributor pump, and inline pump with neat sketches.	BT-3	Applying
12.	Explain the construction and working principles of different injector nozzles. Compare pintle, single-hole, multi-hole, and throttle nozzles with diagrams.	BT-3	Applying
13.	Discuss the stages of fuel injection in a CI engine—pressure rise, atomization, penetration, mixing, and combustion—with sketches.	BT-4	Analyzing
14.	What is a governor? Explain the types of governors used in diesel engines. Discuss mechanical, hydraulic, pneumatic, and electronic governors with diagrams.	BT-3	Applying
15.	Describe the characteristics of governors. Explain sensitivity, stability, effort, and hunting with suitable diagrams.	BT-5	Evaluating
16.	Explain the electrical system of a tractor. Discuss the battery, dynamo/alternator, starter motor, ignition switches, wiring and safety devices.	BT-4	Analyzing
17.	Explain the working of starting, charging, and lighting systems in an engine. Describe the components, circuits, and operational sequence with neat sketches.	BT-4	Analyzing

### UNIT III: TRANSMISSION SYSTEMS

Transmission - clutch - gear box - sliding mesh - constant mesh - synchro mesh. Differential, final drive and wheels. Steering geometry - steering systems - front axle and wheel alignment. Brake - types - system.

#### PART A

Q.No.	Questions	BT Level	Competence
1.	Define transmission system in an automobile.	BT-2	Understanding
2.	What is the function of a clutch?	BT-2	Understanding
3.	List any two requirements of a good clutch.	BT-2	Understanding
4.	Differentiate between single-plate and multi-plate clutch.	BT-2	Understanding
5.	What is clutch slippage?	BT-1	Remembering
6.	Mention two advantages of diaphragm-spring clutch.	BT-1	Remembering
7.	What is a gear box?	BT-1	Remembering
8.	Distinguish between sliding-mesh and constant-mesh gear boxes.	BT-2	Understanding
9.	What is synchromesh and why is it used?	BT-1	Remembering
10.	State the function of a gear selector mechanism.	BT-1	Remembering
11.	What is a final drive in a vehicle?	BT-1	Remembering
12.	Define differential and state its purpose.	BT-1	Remembering
13.	What is the function of differential side gears?	BT-2	Understanding
14.	List any two advantages of a hypoid final drive.	BT-2	Understanding
15.	Name the components included in a wheel assembly.	BT-2	Understanding
16.	What is steering geometry?	BT-2	Understanding
17.	Define caster angle and mention its effect on vehicle stability.	BT-1	Remembering
18.	Define camber and give its significance.	BT-2	Understanding
19.	What is toe-in and toe-out in wheel alignment?	BT-1	Remembering
20.	List the main components of a steering system.	BT-2	Understanding
21.	Differentiate between manual steering and power steering.	BT-1	Remembering
22.	What is Ackermann steering principle?	BT-2	Understanding
23.	Mention two functions of a brake system.	BT-2	Understanding
24.	Write two differences between drum brakes and disc brakes.	BT-1	Remembering
25.	Define hydraulic braking system and list its main units.	BT-1	Remembering

#### PART-B

Q.No	Questions	BT Level	Competence
1.	Explain the construction and working of a single-plate clutch with a neat sketch. Discuss its advantages and disadvantages.	BT-4	Analyzing
2.	Describe the different types of clutches used in automobiles. Explain the working of a diaphragm-spring clutch in detail.	BT-3	Applying
3.	With neat diagrams, explain the layout, components, and power flow in an automobile transmission system.	BT-4	Analyzing
4.	Explain the principle, construction, and operation of a sliding-mesh gear box. Compare it with constant-mesh gear box.	BT-4	Analyzing
5.	Discuss the construction and working of a constant-mesh gear box. Highlight its merits and limitations compared to synchromesh gear box.	BT-3	Applying
6.	Explain the synchromesh device with a neat sketch. Describe the steps involved in smooth gear shifting.	BT-4	Analyzing
7.	Write in detail about the differential. Explain its necessity, construction, working,		

	and types with diagrams.	BT-3	Applying
8.	Explain the final drive mechanism. Discuss the types of final drive and their applications.	BT-4	Analyzing
9.	Describe the construction of wheels and tyres. Explain tyre specifications, functions, and important tyre terminologies.	BT-3	Applying
10.	What is steering geometry? Explain caster, camber, kingpin inclination, toe-in, and toe-out with neat sketches.	BT-3	Applying
11.	Explain Ackermann and Davis steering mechanisms. Compare them and state their applications.	BT-3	Applying
12.	Describe the working of manual steering, power steering (hydraulic), and electric power steering (EPS) systems.	BT-3	Applying
13.	Explain front axle construction and types. Discuss wheel alignment procedure and its importance.	BT-3	Applying
14.	Explain the classification of braking systems in automobiles. Compare hydraulic, mechanical, and pneumatic brake systems.	BT-3	Applying
15.	Describe disc brake and drum brake construction and working. Compare their performance characteristics.	BT-4	Analyzing
16.	Explain ABS (Anti-lock Braking System) with neat diagrams. Discuss components, working, advantages, and limitations.	BT-4	Analyzing
17.	A single plate friction clutch with both sides effective is to transmit 15 kW at 2,000 rev/min. The axial pressure is limited to 0.1 N/mm <sup>2</sup> . If the outer diameter, of the friction lining is 1.5 times the inner diameter. Find the required outer and inner diameters of the friction lining. Assumes uniform wear conditions. The coefficient of friction may be taken as 0.3.	BT-5	Evaluating



#### UNIT IV: HYDRAULIC SYSTEMS

Hydraulic system - working principles, three point linkage and hitching system - draft control - weight transfer, theory of traction - tractive efficiency – tractor chassis mechanics – stability - longitudinal and lateral. Controls - visibility - operator's seat.

#### PART A

Q.No.	Questions	BT Level	Competence
1.	What is the function of a hydraulic system in a tractor?	BT-2	Understanding
2.	State Pascal's law.	BT-1	Remembering
3.	What is the purpose of a hydraulic pump?	BT-2	Understanding
4.	Differentiate between open-centre and closed-centre hydraulic systems.	BT-1	Remembering
5.	What is the role of a hydraulic control valve?	BT - 1	Remembering
6.	List the three members of a three-point linkage system.	BT-2	Understanding
7.	What is the purpose of the top link in a three-point hitch?	BT-2	Understanding
8.	Define the term "hitch point."	BT - 1	Remembering
9.	What is the function of stabilizers in a three-point linkage?	BT-1	Remembering
10.	Differentiate between Category I and Category II hitching standards.	BT-1	Remembering
11.	Define draft control.	BT-1	Remembering
12.	What is position control in tractor hydraulics?	BT-2	Understanding
13.	Explain the term "weight transfer."	BT-2	Understanding
14.	How does draft control help during field operations?	BT - 1	Remembering
15.	Define tractive efficiency.	BT-1	Remembering
16.	What is gross traction?	BT-1	Remembering
17.	Define drawbar horsepower.	BT - 1	Remembering
18.	Mention any two factors affecting traction.	BT-2	Understanding
19.	What is rolling resistance?	BT - 1	Remembering

20.	Define longitudinal stability of a tractor.	BT-2	Understanding
21.	Define lateral stability of a tractor.	BT-1	Remembering
22.	What is centre of gravity and why is it important?	BT-1	Remembering
23.	State two conditions that may cause rear overturning of a tractor.	BT-1	Remembering
24.	Mention any two essential tractor controls.	BT-2	Understanding
25.	A 3 x 30 cm plough is moving at a speed of 4 km/h. Calculate how much time it take to plough 500 x 500 m field when the field efficiency is 70 %?	BT-2	Understanding

**PART – B**

Q.No	Questions	BT Level	Competence
1.	Describe the different types of hydraulic pumps used in tractors. Compare gear pump, vane pump and piston pump in terms of construction and performance.	BT-4	Analyzing
2.	With a neat diagram, explain the three-point linkage system. Discuss its components, geometry and functions in detail.	BT-3	Applying
3.	Explain the hitching system used in tractors. Describe the standard hitch categories, stabilizers and mounting arrangements for implements.	BT-4	Analyzing
4.	Discuss draft control and position control mechanisms in tractor hydraulics. Explain how they function under field loading conditions.	BT-3	Applying
5.	Explain the concept of weight transfer during tractor–implement operation. Discuss factors influencing weight transfer and its effect on field performance.	BT-4	Analyzing
6.	Write in detail the theory of traction. Explain traction forces, rolling resistance, gross traction, net traction and tractive efficiency.	BT-4	Analyzing
7.	Explain the factors affecting tractor traction and methods of improving tractive performance in field operations.	BT-4	Analyzing
8.	With neat sketches, describe tractor chassis mechanics. Explain forces acting on the tractor chassis during field and transport operations.	BT-4	Analyzing
9.	Explain longitudinal stability of a tractor. Discuss reasons for rear overturning and methods to prevent it.	BT-4	Analyzing
10.	Explain lateral stability of a tractor. Discuss side-slope operation, forces involved and safety measures to avoid side overturning.	BT-4	Analyzing
11.	Discuss the principles of tractor stability, centre of gravity, weight distribution, and their influence on safe operation.	BT-3	Applying
12.	Describe various tractor controls. Explain the ergonomic requirements and layout of controls for effective operation.	BT-4	Analyzing
13.	Explain operator visibility requirements in tractors. Discuss factors affecting visibility and design considerations for safety.	BT-3	Applying
14.	With neat sketches, describe the design features of a good tractor operator’s seat. Discuss comfort, anthropometry, suspension and adjustability features.	BT-3	Applying
15.	Discuss the role of hydraulics, linkage geometry and chassis mechanics together in determining tractor performance in primary tillage operations.	BT-4	Analyzing
16.	<b>Write short notes (any four):</b> (a) Hydraulic control valves (b) Category I, II & III linkages (c) Rolling resistance (d) Centre of gravity shift (e) Operator ergonomics	BT-4	Analyzing

17.	Explain the construction and working principle of a tractor hydraulic system with neat sketches. Discuss its advantages and limitations.	BT-3	Applying
-----	--	------	----------

### UNIT V: POWER TILLER, BULLDOZER AND TRACTOR TESTING

Power tiller - special features - clutch - gear box - steering and brake. Makes of tractors, power tillers and bulldozers. Bulldozer- salient features – turning mechanism, track mechanism, components – operations performed by bulldozers. Types of tests- test procedure - need for testing & evaluation of farm tractor – Selection of tractor.

#### PART A

Q.No.	Questions	BT Level	Competence
1.	What is a power tiller and where is it commonly used?	BT-2	Understanding
2.	Mention any two special features of a power tiller.	BT-2	Understanding
3.	What is the function of the clutch in a power tiller?	BT-1	Remembering
4.	State two functions of the gear box in a power tiller.	BT-1	Remembering
5.	What is the purpose of steering clutches in a power tiller?	BT-2	Understanding
6.	Mention two types of brakes used in power tillers.	BT-1	Remembering
7.	Name any two popular makes of tractors in India.	BT-1	Remembering
8.	List any two common brands of power tillers used in agriculture.	BT -1	Remembering
9.	Mention any two manufacturers of bulldozers.	BT-1	Remembering
10.	What are the salient features of a bulldozer?	BT-1	Remembering
11.	Define a bulldozer blade and state its purpose.	BT-2	Understanding
12.	What is a track mechanism in a bulldozer?	BT-1	Remembering
13.	Mention any two components of a bulldozer undercarriage.	BT-2	Understanding
14.	What is meant by a bulldozer's turning mechanism?	BT-2	Understanding
15.	List any two farm operations performed using a bulldozer.	BT-1	Remembering
16.	What is a drawbar test in tractor testing?	BT-1	Remembering
17.	What is an engine performance test?	BT-1	Remembering
18.	Define PTO power and why it is measured.	BT-2	Understanding
19.	What is the need for testing and evaluating farm tractors?	BT-2	Understanding
20.	Mention any two BIS standards used for tractor testing.	BT-1	Remembering
21.	What is field test evaluation in tractors?	BT-2	Understanding
22.	List any two parameters considered during tractor brake testing.	BT-1	Remembering
23.	What is meant by tractor noise and vibration testing?	BT-2	Understanding
24.	Mention any two factors to consider when selecting a tractor for a farm.	BT-2	Understanding
25.	Define tractor stability and state why it is important during selection.	BT-1	Remembering

#### PART-B

Q.No	Questions	BT Level	Competence
1.	Explain the construction and working of a power tiller. Discuss its special features and field applications with neat sketches.	BT-4	Analyzing
2.	Describe the different types of clutches used in power tillers. Explain their construction, working principle and advantages.	BT-3	Applying
3.	With neat diagrams, explain the gear box arrangement in a power tiller. Discuss forward, reverse and speed-selection mechanisms.	BT-3	Applying

4.	Explain the steering mechanism and braking system of a power tiller. Discuss how steering clutches assist in maneuvering.	BT-4	Analyzing
5.	Compare power tillers and tractors in terms of construction, working, performance and suitable field conditions.	BT-4	Analyzing
6.	Write in detail about the major tractor manufacturers, power tiller makes and bulldozer makes used in India. Explain their key features.	BT-3	Applying
7.	Describe the salient features of a bulldozer. Explain its construction, blade types, uses and suitability for different field operations.	BT-3	Applying
8.	With neat sketches, explain the turning mechanism of a bulldozer. Discuss clutch-brake turning, differential steering and power-shift steering.	BT-3	Applying
9.	Explain the track mechanism of a bulldozer. Describe undercarriage components, track chain, rollers and sprocket arrangement.	BT-4	Analyzing
10.	Write notes on bulldozer components such as blade, ripper, undercarriage and hydraulic system. Explain the role of each in operation.	BT-4	Analyzing
11.	Discuss the major operations performed by bulldozers. Explain land clearing, dozing, grading, ditching, backfilling and earthmoving.	BT-3	Applying
12.	Explain the need for testing and evaluation of farm tractors. Discuss national and international testing standards and their importance.	BT-3	Applying
13.	Describe the different types of tractor tests (engine test, PTO test, drawbar test, brake test, hydraulic test, noise & vibration test) with their purposes.	BT-3	Applying
14.	With neat diagrams, explain the complete procedure for PTO performance testing and the interpretation of results.	BT-3	Applying
15.	Explain the procedure of field performance testing of tractors. Discuss parameters measured, test setup and evaluation criteria.	BT-4	Analyzing
16.	Discuss the factors influencing tractor selection for a farm. Explain horsepower requirement, soil conditions, cropping system, implements and economics.	BT-4	Analyzing
17.	Write short notes (any four): (a) Drawbar horsepower (b) Track-type tractors (c) Hydraulic controls of bulldozers (d) BIS tractor testing standards (e) Power tiller applications	BT-4	Analyzing