SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institutions)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF MECHANICAL ENGINEERING

QUESTION BANK

IV SEMESTER

1909407 – FARM TRACTORS

Regulation–2019

Academic Year 2021-2022 (Even Semester)

Prepared by

Mrs. N.NITHYA, Assistant Professor (Sr.G.)/ MECH

SRM VALLIAMMAI ENGINEERINGCOLLEGE
(An Autonomous Institutions)
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF MECHANICAL ENGINEERING

QUESTION BANK

SUBJECT NAME : FARM TRACTORS

Sem / Year: IV / II

UNIT 1: TRACTORS			
Classification of tractors - Tractor engines - Construction of engine blocks, cylinder head and crankcase - Features of cylinder, piston, connecting rod and crankshaft - Firing order combustion chambers.			
PART-A			
Q.No.	**Questions**	**BT Level**	**Competence**
1.	Define 'off road vehicle'. Give examples.	BT-1	Remembering
2.	Give the classification of tractor.	BT-2	Understanding
3.	Discover the factors we need to consider while selecting the tractor.	BT-3	Applying
4.	Infer where the crawler tractors are preferred in farm activities.	BT-4	Analyzing
5.	Show the purposes of ploughing.	BT-3	Applying
6.	Name the basic components of tractor.	BT-1	Remembering
7.	What is an I.C. Engine? Give its types.	BT-1	Remembering
8.	Differentiate Internal Combustion and External Combustion engine.	BT-2	Understanding
9.	What is clearance volume?	BT-1	Remembering
10.	Define compression ratio of an engine.	BT-1	Remembering
11.	What is the major function of an engine cylinder?	BT-2	Understanding
12.	Give the primary function of crankshaft.	BT-2	Understanding
13.	What are the materials used for crank shaft and connecting rod in tractor engine?	BT-1	Remembering
14.	Define swept volume.	BT-1	Remembering
15.	List the parts of engine piston.	BT-1	Remembering

16.	What is meant by firing order of an IC engine?	BT-2	Understanding
17.	Which fuel engine is efficient for farm operations and why?	BT-6	Creating
18.	List at least four benefits of farm mechanization.	BT-1	Remembering
19.	What are the farm powers in India?	BT-2	Understanding
20.	List the firing orders of six cylinder diesel engine.	BT-1	Remembering

PART-B

Q.No		Questions	BT Level	Competence
1.		What are the sources of farm power in India? What are the importance of animal power and tractor power in India?	BT-2	Understanding
2.		How will you classify tractors? Describe their utility on various farms.	BT-3	Applying
3.		Explain the basic construction of tractor with neat sketch.	BT-3	Applying
4.		Explain the constructional details of an engine block.	BT-4	Analyzing
5.		Illustrate different components if IC engine with diagram.	BT-3	Applying
6.		Explain about various types of piston with neat diagram.	BT-4	Analyzing
7.		Briefly explain about various types of piston failures.	BT-3	Applying
8.		Write short notes on working of four stroke SI engine with sketch.	BT-2	Understanding
9.		Discuss about the working of two stroke CI engine with neat diagram.	BT-2	Understanding
10.		Compare petrol and diesel engine.	BT-4	Analyzing
11.		An engine has a cylinder 10 cm. The length of the stroke is also 10 cm. Find the piston swept volume. If the clearance is 1/5 of the swept volume. Find the cylinder volume and compression ratio.	BT-4	Analyzing
12.		List the advantages and disadvantages of two stroke cycle over four stroke cycle engine.	BT-1	Remembering
13.		A three cylinder 4-stroke engine develops 32 bhp, when the cylinder bore is 9 cm, stroke = 12.5 cm, compression ratio = 16.5: 1, engine speed = 2000 rpm and mechanical efficiency = 80%. Calculate	BT-4	Analyzing

		(i) Piston displacement (ii) Displacement volume (iii) Piston speed (iv) Stroke-bore ratio (v) BMEP (vi) IHP (vii) FHP		
14.		A 4 cylinder 4 stroke diesel engine has cylinder diameter 60 mm and stroke 98mm. What is the total volume of air sucked in cm^3 is 100 revolutions of the engine?	BT-4	Analyzing

PART-C			
1.	Discuss the status and challenges of farm mechanization in India.	BT-2	Understanding
2.	Explain the overhead cost estimation procedure for farm machineries.	BT-3	Applying
3.	Discuss the merits and demerits of using more machinery in agriculture in your point of view.	BT-2	Understanding
4.	How electrical power is an important power source in Indian agriculture?	BT-6	Creating

UNIT-II: ENGINESYSTEMS

Valves- inlet and outlet valves - Valve timing diagram - Air cleaner - Exhaust –Silencer - Cooling systems - Lubricating systems - Fuel system - Governor- Electrical system.

PART-A

Q.No.	Questions	BT Level	Competence
1.	What are the engineering materials used for inlet and exhaust valve?	BT-6	Creating
2.	Give different valve operating mechanisms.	BT-2	Understanding
3.	Illustrate the purpose of valve timing diagram.	BT-3	Applying
4.	What is the role of a pre-cleaner?	BT-2	Understanding
5.	List the uses of dusters.	BT-1	Remembering
6.	Classify the types of dusters.	BT-3	Applying
7.	How does a muffler work?	BT-2	Understanding
8.	Write any two reasons for engine knocking.	BT-2	Understanding
9.	Define the term air fuel ratio. How it is important?	BT-1	Remembering
10.	Define knocking.	BT-1	Remembering
11.	Conclude the causes of detonation.	BT-5	Evaluating
12.	What is meant by scavenging?	BT-2	Understanding
13.	Identify different types of Governor.	BT-1	Remembering
14.	When an engine cooling system needed to be operated in colder regions which cooling system will be good? Justify.	BT-6	Creating
15.	What is the importance's of cooling system?	BT-2	Understanding
16.	What are the disadvantages of overheating in engine?	BT-2	Understanding
17.	What are the disadvantages of overcooling in engine?	BT-2	Understanding
18.	What are the types of lubrication system?	BT-1	Remembering
19.	Give the ideal properties of fuel used in tractor engine.	BT-2	Understanding
20.	What are the types of fuel injection system?	BT-1	Remembering

		PART-B		
Q.No		**Questions**	**BT Level**	**Competence**
1.		What are the various types of valve? Briefly explain about the working of poppet valve.	BT-4	Understanding
2.		Explain about various valve operating mechanisms with neat sketches.	BT-4	Analyzing
3.		Briefly explain about the valve timing diagram for a four stroke SI engine.	BT-3	Applying
4.		Discuss about the valve timing diagram for a four stroke CI engine.	BT-2	Understanding
5.		Explain various components used in exhaust system.	BT-4	Analyzing
6.	a.	What are the properties of efficient cooling system? (6)	BT-2	Understanding
	b.	What are the difference between air and water cooling system? (7)		
7.		Explain various types of water cooling system with neat diagrams.	BT-4	Analyzing
8.		Explain about various parts of radiator with neat sketch.	BT-4	Analyzing
9.	a.	Point out the purposes of lubrication. (6)	BT-4	Analyzing
	b.	Explain the types of lubricants. (7)		
10.		With suitable sketch explain pressurized lubricating system of a tractor with neat sketch.	BT-3	Applying
11.		Explain about fuel injection pump with neat sketch	BT-4	Analyzing
12.		Briefly explain about battery and coil ignition system with neat sketch.	BT-3	Applying
13.		Discuss about the governor using a sketch.	BT-2	Understanding
14.		Explain about the components of charging system.	BT-4	Analyzing

PART-C			
1.	Discuss the fuel system employed in the engine which is used in farm tractors.	BT-2	Understanding
2.	Explain the constructional details of starting system.	BT-4	Analyzing

3.	What is the function of a governor in tractor? Classify the governing systems. With a neat sketch explain the working of a centrifugal governor.	BT-2	Understanding
4.	Briefly explain about the starting system used in farm tractor engine.	BT-3	Applying

UNIT III: TRANSMISSIONSYSTEMS

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.	What are the functions of transmission system in a tractor engine?	BT-2	Understanding
2.	What are the various components in transmission system?	BT-2	Understanding
3.	Examine the importance of clutch in power tiller.	BT-3	Applying
4.	What are the purpose of clutch?	BT-2	Understanding
5.	What are the types of clutch?	BT-1	Remembering
6.	List out the basic functions of a gearbox.	BT-1	Remembering
7.	What are the importance's of sliding mesh gear box?	BT-1	Remembering
8.	What is the primary function of constant mesh gear box?	BT-2	Understanding
9.	Point out the importance of synchro mesh gear box.	BT-4	Analyzing
10.	What is the common ply rating of tyres used in agriculture operations?	BT-6	Creating
11.	What is PTO? Mention its applications.	BT-4	Analyzing
12.	Write a note on tread and retreading of a tyre.	BT-1	Remembering
13.	What are the different types of Brake system used in tractor?	BT-2	Understanding
14.	Show the functions of brake lining.	BT-3	Applying
15.	What are the importance's of a braking system?	BT-2	Understanding
16.	Criticize the causes of poor brakes.	BT-5	Evaluating
17.	What are the functions of brake shoe?	BT-1	Remembering
18.	Give the advantages of disc brake.	BT-2	Understanding
19.	What is the purpose of steering linkage?	BT-1	Remembering
20.	What is known as power steering?	BT-2	Understanding

		PART-B		
Q.No	**Questions**		**BT Level**	**Competence**
1.		Explain the principle of operation of a clutch and discuss the single plate and multi plate clutch systems in detail.	BT-4	Analyzing
2.	a.	What are the requirements of the clutch? (6)	BT-3	Applying
	b.	Explain about centrifugal clutch. (7)		
3.		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/mm². 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-4	Analyzing
4.		List the all types of gears in tractor and explain any two types with neat sketch.	BT-1	Remembering
5.		Write short notes on the principle of gearing. How is the final gear reduction in tractor arrived?	BT-4	Analyzing
6.		Discuss how a steering system in a tractor works with a help of diagram.	BT-2	Understanding
7.		Explain the steering mechanism of tractor.	BT-4	Analyzing
8.		Illustrate the working of differential with neat sketches.	BT-3	Applying
9.		Explain briefly the different types of differential used in tractor.	BT-2	Understanding
10.	a.	Discuss the need of gearbox. (6)	BT-2	Understanding
	b.	Express about sliding mesh gearbox. (7)		
11.	a.	Brief about constant mesh gear box. (6)	BT-3	Applying
	b.	Explain in detail about synchromesh gearbox. (7)		
12.		Describe the construction and operation of power steering with neat sketch.	BT-1	Remembering
13.		Discuss the working principle of brake system in tractor with sketch.	BT-2	Understanding
14.		Explain in detail the different types of brakes with neat diagram.	BT-4	Analyzing

PART-C			
1.	Explain the common troubles encountered in gear boxes and suggest suitable remedies.	BT-6	Creating
2.	A sliding mesh type of gear box with forward speeds only is to be designed. The gear box should have the following gear ratios available approximately: 1.0, 1.5, 2.5 and 3.9. the center distance between the lay shaft and the main shaft is 78 mm and the smallest gear is to have at least 16 teeth with a diametric pitch of 3.25 mm. calculate the number of teeth of the various gears and the exact gear ratios thus available.	BT-4	Analyzing
3.	Make a detailed comparison of various types of transmission systems used in farm tractors	BT-4	Analyzing
4.	Discuss the principle of operation, components, functions and advantages of a combine harvester.	BT-2	Understanding

UNIT IV: HYDRAULIC SYSTEMS

Hydraulic system - Working principles, three-point linkage - draft control - Weight transfer, theory of traction - Tractive efficiency - Tractor chassis mechanics - Stability - Longitudinal and lateral Controls - Visibility - Operators seat.

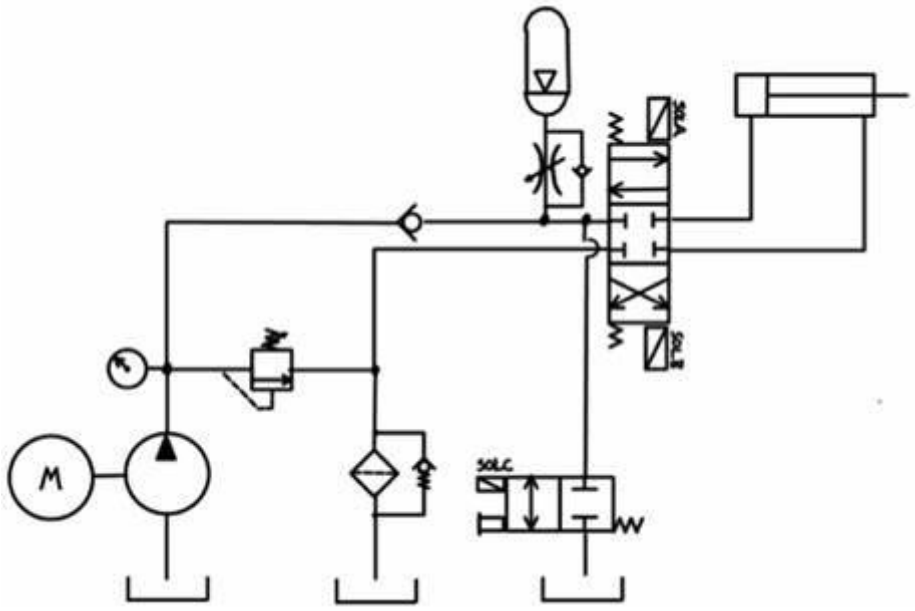
PART A

Q.No.	Questions	BT Level	Competence
1.	What are the four primary functions of hydraulic system in farm tractors?	BT-2	Understanding
2.	List the basic components of hydraulic system.	BT-1	Remembering
3.	Classify pump.	BT-3	Applying
4.	Give few properties of hydraulic fluid should possess.	BT-1	Remembering
5.	Why must a hydraulic fluid have good lubricating ability?	BT-6	Creating
6.	What type of fluid is more generally used to transmit power in hydraulic system?	BT-2	Understanding
7.	What is positive displacement pump?	BT-2	Understanding
8.	In what ways does positive displacement pump differ from a centrifugal pump?	BT-6	Creating
9.	What is the use of three point linkage?	BT-1	Remembering
10.	What are the functions of an accumulator?	BT-1	Remembering
11.	Define tractive efficiency.	BT-1	Remembering
12.	What is the condition for front wheel to leave the ground as per traction theory?	BT-4	Analyzing
13.	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-4	Analyzing
14.	How is the effective field capacity of a farm machine calculated?	BT-6	Creating
15.	What is meant by vehicle stability?	BT-1	Remembering
16.	Define position control	BT-1	Remembering
17.	Why traction control is important in field farming?	BT-6	Creating
18.	Give the functions of an intensifier.	BT-2	Understanding
19.	How will you evaluate the visibility factors for agricultural tractor operators?	BT-5	Evaluating

20.	Give various application circuits using hydraulic systems.	BT-2	Understanding

		PART - B		
Q.No		**Questions**	**BT Level**	**Competence**
1.		Explain the working of hydraulic system in a tractor with a neat sketch.	BT-4	Analyzing
2.		Express about the working of various components of hydraulic system in a tractor with a neat diagram.	BT-2	Understanding
3.		Explain various types of hydraulic system with neat sketches.	BT-4	Analyzing
4.		Discuss about three point linkage using neat diagram.	BT-2	Understanding
5.		Brief about hydraulic steering system with suitable sketch.	BT-4	Analyzing
6.	a.	Explain the following Position control (7)	BT-4	Analyzing
	b.	Draft control (6)		
7.		Explain about hydraulic brakes with suitable diagram.	BT-4	Analyzing
8		Total draft of four bottom, 35 cm MB plough when ploughing 18 cm deep at 5 kmph speed is 1600 kg. (i) Calculate the unit draft in kg/cm² (ii) What is actual power requirement? (iii) If the field efficiency is 75% what is the rate of doing work in ha/h.	BT-4	Analyzing
9.		Discuss the trouble shooting in tractor components their causes and remedies under hydraulic system disc functioning.	BT-2	Understanding
10.		What are the components in hydraulic system of a bulldozer? Explain it with neat sketch.	BT-3	Applying
11.		What do you mean by draft? Write formula for calculation of draft. What are the factors affecting the draft?	BT-2	Understanding
12.		Explain about maintenance and repair of hydraulic system.	BT-4	Analyzing
13.		Discuss about tractive efficiency with suitable parameters.	BT-2	Understanding

14.		Explain about operator seating arrangement with neat sketch.	BT-4	Analyzing

	PART-C		
1.	A four-wheel tractor is plowing up a hill of 15° slope with three bottom 35 cm mould board plow at a speed of 4 km/hr. The tractor weighting 1590 kg has a wheel base of 240 cm and wheel trade of 115 cm. The C.G. is located 90 ahead of rear axle and 75 cm above the ground. The drawbar height is 40 cm. The line of pull of the implement makes an angle of 25° with the ground and is at a distance of 50 cm from the rear wheel contact point. Neglect rolling resistance. Assume: Cohesion coefficient = 0.15, Contact area =1650 cm², Angle of internal friction = 30°. Find: (i) Reaction at the wheel (5) (ii) Pull (5) (iii) Tractive force. (5)	BT-4	Analyzing
2.	Discuss about the Mechanics of the tractor chassis with proper sketches.	BT-2	Understanding
3.	Explain about the following hydraulic circuit. 	BT-6	Creating
4.	How will you evaluate traction parameters? Give one suitable example.	BT-5	Evaluating

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 - Test code for performance testing of tractors and power tillers.

PART A

Q.No.	Questions	BT Level	Competence
1.	Differentiate tracts and tyres in a bull dozer.	BT-2	Understanding
2.	What are the mobile sources of farm power?	BT-2	Understanding
3.	How does a bulldozer work? List down its parts.	BT-4	Analyzing
4.	Explain shortly the types of power tillers.	BT-4	Analyzing
5.	What do you mean by conservation tillage?	BT-2	Understanding
6.	What are the different methods of threshing the food grains?	BT-1	Remembering
7.	Draw and mark the parts of any primary tillage equipment.	BT-4	Analyzing
8.	Power tiller is advantageous over Tractor. Justify when and how?	BT-6	Creating
9.	Name any two applications of Bulldozer in agriculture.	BT-1	Remembering
10.	What are the different types of threshers used in agriculture based on power usage?	BT-1	Remembering
11.	Write the two distinct features of power tiller.	BT-2	Understanding
12.	List the types of harrows.	BT-1	Remembering
13.	Write the different types of tillage.	BT-2	Understanding
14.	Write the regular maintenance of tractor after 8 hours of work.	BT-2	Understanding
15.	What is mulch tillage?	BT-1	Remembering
16.	What is meant by zero tillage?	BT-1	Remembering
17.	What are the components of power tiller?	BT-3	Applying
18.	What are the major parts of combine harvesters?	BT-2	Understanding
19.	How the depreciation of machinery is calculated using Straight Line method?	BT-4	Analyzing
20.	List any two equipment for seeding and planting.	BT-1	Remembering

		PART-B		
Q.No		**Questions**	**BT Level**	**Competence**
1.		A flywheel type of chaff cutter has 2 cutting blades and flywheel rotates at 600 rpm. The width and the height of the throat are 300 mm and 100 mm respectively. The density of the forage in the throat is 100 kg/m³. The desired theoretical length of cut of the chaff is 10 mm. What is the theoretical capacity of the chaff cutter?	BT-4	Analyzing
2.		Briefly discuss the factors influencing the performance of a thresher.	BT-2	Understanding
3.		Discuss the special features of bull dozers and their merits.	BT-2	Understanding
4.		Compare and contrast Tractors and Power tillers in various dimensions.	BT-4	Analyzing
5.		Explain the disc plough, tilt angle and disc angle with neat sketches.	BT-4	Analyzing
6.		Discuss the various forces acting upon a tillage implement?	BT-2	Understanding
7.		Discuss the use of power tiller in agricultural operations.	BT-2	Understanding
8.		Write about clutch used in power tiller with neat sketch.	BT-2	Understanding
9.		Explain the operation principle and components of harvesting equipment.	BT-4	Analyzing
10.		Explain the working of a bull dozer with its basic parts.	BT-4	Analyzing
11.		What are the different types of bulldozer? Explain their working principle.	BT-1	Remembering
12.		Write in detail the special features of power tillers.	BT-1	Remembering
13.		Discuss the advantages of power tillers.	BT-2	Understanding
14.	a.	Explain primary and secondary tillage. (7)		
	b.	List down the implements used for both the tillage and	BT-1	Remembering

		explain them briefly. (6)		

	PART-C			
1.	a.	Discuss the principle of operation, components, functions and advantages of a combine harvester. (7)	BT-2	Understanding
	b.	A bullock drawn desi plough working at 2.4 kmph cuts soil 10 cm deep and makes 20 cm wide furrow at the top. Calculate the volume of soil handled in 3 hours. (8)	BT-4	Analyzing
2.		Explain the importance of periodic maintenance of the tractor.	BT-3	Applying
3.		Write about the common troubles of tractor engine and their remedies.	BT-2	Understanding
4.		Discuss in detail about the inter cultural implements and harvesting implements.	BT-2	Understanding