B.E. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

AGRICULTURAL AND IRRIGATION ENGINEERING

SIXTH SEMESTER

AI 9351 TRACTOR AND FARM EQUIPMENTS

(Regulation R2008)

Time: 3 Hours   Answer ALL Questions   Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Which fuel engine is efficient for farm operations and why?

2. What are the different types of Governor?

3. What is the condition for front wheel to leave the ground as per traction theory?

4. What are the different types of Brake system used in tractor?

5. Power tiller is advantageous over Tractor. Justify when and how?

6. Name any two applications of Bulldozer in Agriculture.

7. What are the different types of Threshers used in Agriculture based on power usage?

8. 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?

9. What are the ways by which Biomass can be converted into energy?

10. What are the non-conventional sources of farm power?

Part – B (5 x 16 = 80 marks)

11. i) 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 (i) piston displacement, (ii) displacement volume (iii) piston speed, (iv) stroke-bore ratio (v) bmep (vi) ihp and (vii) fhp. (8)

    ii) A centrifugal type of governor is mounted on the camshaft of a diesel engine running at a speed of 1600rpm and has following specifications:
    Effective lever arm a=3 cm, b=4 cm and L=7.5 cm, angle of arm with axis of rotation when weights are in closed position, θ=0°, angle of arm with axis of rotation when weights are in open position, θ=45°, Spring tension on sleeve=5Kg/Cm. Find out the weights attached to the end arms of the governor. (8)

12. a) i) 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 1500 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: (a) reaction at the wheel (b) Pull (c) Tractive force. (10)

ii) Explain briefly the different types of differential used in tractor. (6)

(OR)

b) i) 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. (6)

ii) Explain in detail the different types of brakes used in tractors. (10)

13. a) Explain briefly the special features, executing problematic operations and advantages of a Power Tiller. (16)

(OR)

b) Explain briefly about the working and components of Bulldozer. (16)

14. a) i) A tractor-drawn single acting disk harrow is moving at a forward speed of 4.5 km h-1. Each gang of the disk harrow has 7 disks of 450 mm diameter each with a disk spacing of 200 mm. What is the field capacity of the disc harrow? (6)

ii) Explain briefly the different types of Primary Tillage Implements used in Agriculture. (10)

(OR)

b) i) Explain briefly the different types of Sprayers. (8)

ii) Explain briefly the different components and working of combine harvester. (8)

15. a) i) Explain briefly the biomass energy conversion methods. (8)

ii) Explain briefly the technique of briquetting. (8)

(OR)

b) i) Explain briefly the different types of solar energy collectors. (8)

ii) Explain briefly the different types of cost involved with maintaining machinery.(8)