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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013

AGRICULTURAL AND IRRIGATION ENGINEERING

SIXTH SEMESTER

AI 9351 TRACTORS AND FARM EQUIPMENTS

(Regulation 2008)

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. When an engine cooling system needed to be operated in colder regions which cooling system will be good? Justify.
3. What are the parts of a power transmission train?
4. What is a PTO and mention its application?
5. Power tiller is advantageous over Tractor. Justify when and how?
6. Name any two applications of Bulldozer in Agriculture.
7. What is 'Mulch Tillage'?
8. What are the major parts of combine harvesters?
9. What are the disadvantage in converting Biomass into Energy?
10. What are the costs included in ownership costs?

Part – B (5 x 16 = 80 marks)

11. i. A four cylinder, four stroke cycle diesel engine develops 40 kW power at 35 rps. The mean effective pressure in each cylinder is 8.5 bars and mechanical efficiency of engine is 80%. Calculate the dimensions of the engine. (8)

ii. An engine tractor burns diesel ($C_{16}H_{34}$) with 10% excess air and develops 30 KW with 24% thermal efficiency based on higher heating value of fuel. Calculate the air-fuel ratio. Use the base equation

$$C_mH_n+(m+n/4)O_2+3.76(m+n/4)N_2 \longrightarrow mCO_2+n/2H_2O+3.76(m+n/4)\ N_2$$

(8)

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12. a) i. A tractor fitted with 90X100 mm size 4 cylinder 4-stroke cycle IC diesel engine with compression ratio of 16:1 develops 40 IHP at an operating speed of 2000 rpm. It consumes 8.5 litres/hr diesel at full load. Assume that mechanical efficiency of engine is 85% and density of diesel is 830 kg/m^3. Calculate the fuel delivered per cycle by the FI pump of engine. (10)

ii. Explain briefly the two types of lubricating system. (6)

OR

b) i. A centrifugal type of governor mounted on the camshaft of an engine running at a speed of 1800 rpm has the specifications as effective lever arm a=3 cm, b= 3.5 cm, L=6 cm, Angle of arm with axis of rotation when weights are in closed position is 0^0 and angle of arms axis of rotation when weights are in open position is 30^0, spring tension on the sleeve=6 kg/cm. Find out the weights 'W' attached to the end of arms of the governor. (8)

ii. Explain briefly the Electrical system in a tractor. (8)

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. Explain briefly the different types of primary tillage equipments used in the farm. (8)

ii. A four bottom 40 cm M.B. Plough has a working depth of 15 cm and draft of 1600 kg. It is working at a speed of 4.5 km/hr with field efficiency of 70%. Calculate unit draft, drawbar power and actual field capacity. (8)

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)