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B.Tech Even Semester (CBCS) Exam., May—2018

AGRICULTURAL ENGINEERING

(4th Semester)

Course No. : AECC–13

(Farm Power)

Full Marks : 50

Pass Marks : 15

Time : 2 hours

Note :
1. Attempt *any* **five** questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the right margin indicate full marks for the questions.

1. *(a)* State advantages and disadvantages of farm mechanization. 4

(b) In a diesel engine with variable compression ratio, the initial compression ratio 16 : 1. The ratio of specific heats is 1·4. For the same cut-off ratio of 4, if the compression ratio is increased by 25%, what percentage of the air standard thermal efficiency of the engine will be changed? 6

2. *(a)* State different types of brakes used in tractor. 4

(b) The intake pressure of a diesel engine is 1 bar and pressure at the end of the compression is 34 bar. If the adiabatic exponent is 1·3 and the expansion ration is 7, calculate diesel cycle efficiency. 6

3. *(a)* Explain function of lubrication system in tractor. 3

(b) A 2-cylinder, 4-stroke diesel engine develops 15 kW power at 2400 r.p.m. Its brake specific fuel consumption is 0·268 kW ^{1}h ^{1}. If the specific gravity of fuel is 0·85, calculate the quantity of fuel injected per cycle in m^{3}. 7

4. *(a)* Explain the mechanical steering system of tractor with detailed sketch. 5

(b) A 4-cylinder, 4-stroke compression ignition engine has piston stroke of 10·5 cm and cylinder bore of 11 cm. At a mean piston speed of 7 m s ^{1}, the developed brake mean effective pressure is 650 kPa. How much brake power in kW will be developed by the engine? 5

5. *(a)* A single dry plate clutch transmits 10 horsepower at 900 r.p.m. The axial pressure is limited to 0·7 kg/cm^2. If the coefficient of friction is 0·25, find *(i)* mean radius and face width of friction lining assuming the ratio of the mean radius to the face width as 4 and *(ii)* outer and inner radii of the clutch plate. 6

(b) A tractor gearbox has 8 forward speeds. The speed ratios (number of engine revolutions for one revolution of driving wheel) vary in exact geometrical progression. If the speed ratios in highest and lowest gears are 14·9 and 108·8, respectively, find out the geometric constant of the transmission system. 4

6. *(a)* Explain magnetoignition system with a neat sketch. 5

(b) With neat sketch explain manual transmission system of tractor. 5

7. *(a)* Explain forced feed cooling system with detailed sketch. 5

(b) Calculate stoichiometric air-fuel ratio for diesel ($C_{12}H_{23}$). 5

8. *(a)* Why differential lock is necessary in a tractor? 2

(b) Write short notes on the following : 2×4=8

(i) Valve timing

(ii) Pressure cap

(iii) Starter

(iv) Octane number

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