EGERTON UNIVERSITY

UNIVERSITY EXAMINATIONS

NJORO CAMPUS

FIRST SEMESTER 2012/2013

THIRD YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURAL ENGINEERING

AGEN 332: INTRODUCTION TO FARM POWER

STREAM: 2010 (Y3) B. SC. AGEN **TIME:** 2 hours

DAY/TIME: THURSDAY, 8.30 – 11.30 am **DATE:** 17/01/2013

INSTRUCTIONS:

1. The paper contains **FIVE (5)** questions.
2. Attempt **ALL** questions.
3. All questions carry equal marks.
4. Shown in parenthesis are marks for each question.
5. **EACH QUESTION SHOULD BE STARTED ON A NEW PAGE.**

QUESTION ONE

(a) How does a two-stroke engine differ from a four-stroke engine? **(8 marks)**

(b) With explanation, trace the fuel system in tractors and explain how bleeding would be carried out in case of air lock **(5 marks)**

(c) In the cooling system of CI engines, what is the expected temperature control above ambient? **(1 mark)**

(d) If a tractor develops 90 kW with a coolant temperature differential of 5.8 °C, what is the quantity of water that would have to be circulated and what amount of heat would have to be dissipated to the air? **(6 marks)**

QUESTION TWO

(a) List features found in a tractor hydraulic system and explain their functions. **(7 marks)**

(b) Why is ballasting important in tractors? **(2 marks)**

(c) Explain the components of a complete drive train in tractors. **(11 marks)**

QUESTION THREE

(a) Differentiate between body and fluidity in viscosity. **(6 marks)**

(b) During the peak working period, when should the fuel tank be filled and why? **(2 marks)**

(c) Explain the following:

(i) Inclusion of differential lock in the design of tractors **(2 marks)**

(ii) Design and use of independent brake system **(2 marks)**

(d) A four-stroke-cycle SI engine has a bore of 8 cm and a stroke of 10.7 cm. Calculate piston displacement and clearance volume if the CR is 6. What is the engine capacity if the engine has five cylinders? **(8 marks)**

QUESTION FOUR

(a) Explain the role of the following in tractors:

(i) Radiator cap. **(1 mark)**

(ii) Governor. **(3 marks)**

(iii) Air cleaner requirements and arrangement. **(6 marks)**

(b) Describe the factors involved in tractor cooling and how trouble shooting would be carried out if overheating occurs. **(5 marks)**

(c) Explain the process of hitching and unhitching a PTO operated soil acting implement. **(3 marks)**

(d) What is the role of stabilizer and check chains in tractors? **(2 marks)**

QUESTION FIVE

(a) Explain how a basic engine starting circuit works. **(6 marks)**

(b) What is the amount of air flow that must pass through a diesel engine with a displacement of 3,500 litres running at 2,800 rpm? Assume volumetric efficiency to be 88%. **(3 marks)**

(c) Comment about thermal efficiencies in CI and SI engines. **(2 marks)**

(d) Why are breather pipes installed in engines? **(2 marks)**

(e) Explain about the use of turbochargers and inter-cooling in engines. **(4 marks)**

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