"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE & NATURAL SCIENCES

NAAE 211: FARM POWER AND MACHINERY

END OF SECOND SEMESTER FINAL EXAMINATIONS

APRIL 2022

LECTURER: MR. W. ZENDERA

DURATION: 3 HOURS

INSTRUCTIONS

Answer ALL question in Section A20 Marks

Answer four questions in Section B 80 Marks

Use the answer booklet provided
Begin the Answer for each question on a new page

Begin Your Answer for Each Question on a New Page

Credit is Given for Neat Presentation

Section A

(Answer All Questions, 20 Marks)

Name the part of the seed drill that performs the following functions:

1) Holding the seed, _____ [1 mark]
2) Opening the furrow into which seeds are placed_____ [1 mark]
3) Metering the seeds at the required rate and equal
   interval_____ [1 mark]
4) Placing the seed into the furrow _____ [1 mark]
5) Lightly compacting around the seed _____ [1 mark]

Answer the following
6) State the two main functions of sprayers. [2 marks]
7) State any three seed placement methods. [3 marks]

Identify the following components of a combine harvester in Figure 1
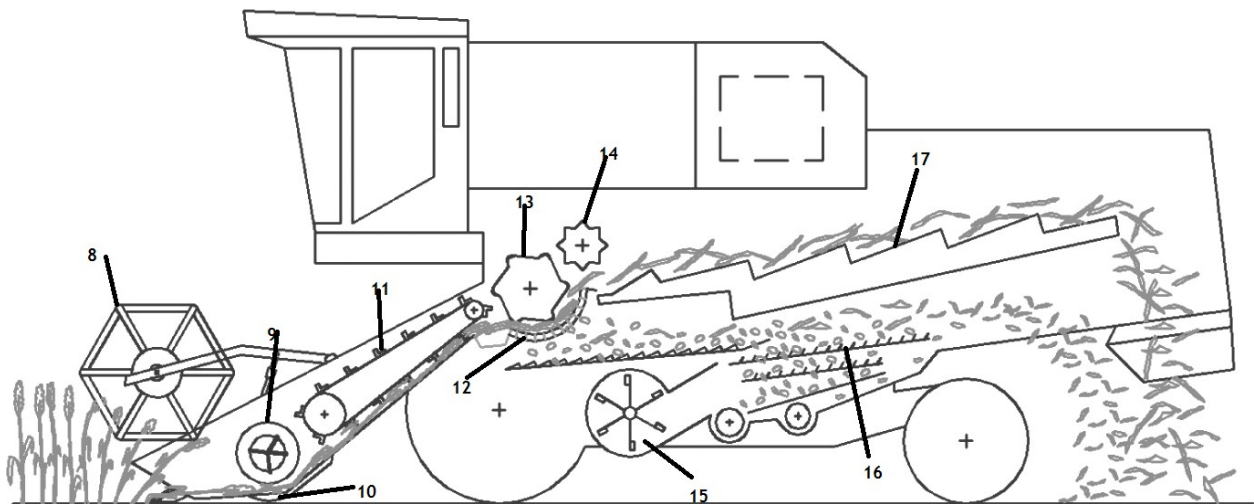
labeled 8 -17. [10 marks]

Figure 1

Section B

(Answer Four Questions, 80 Marks)

Question 1B

a) Discuss the ways of improving the field efficiency of machinery operations such as planting, disking and harvesting using a combine. [10 marks]
b) Explain machinery leasing as a means of acquiring farm equipment. [5 marks]
c) Owning and operating a certain machine to till 350 hectares incurs ownership costs of $10000 per year and operating costs of $20 per ha including labour. Leasing a similar machine with a capacity of 2 hectares per hour to do the same work would cost $80 per hour plus the same operating costs. Which alternative will have the lowest cost. [5 marks]

Question 2B

a) Explain the difference between a seed drill and a precision planter. [5 marks]
b) A seed drill has 8 furrow openers and covers a width of 1.2 m in one pass. It has a wheel diameter of 1m. in order to calibrate the machine, calculate the following:
  i.   Spacing between adjacent furrow openers. [3 marks]
  ii.   The length of travel necessary to cover 0.05 ha; [4 marks]
  iii. The number of wheel revolutions necessary to cover 0.05 ha; [4 marks]
  iv.   The amount of seed expected from each tube to provide a seed rate of 100 kg/ha. [4 marks]

Question 3B

a) Describe the effect of the following adjustments on a disc plough.
  • Spacing between discs [3 marks]
  • Horizontal angle [3 marks]
  • Tilt angle [3 marks]
b) Describe the mode of function of the two most common types of agitators in sprayers. [4 marks]
c) You have a 6 m boom with 8 nozzles spaced at 75 cm apart. The average output nozzle is 3.5 l/min the sprayer is equipped with 380 litre tank and will be used at a speed of 6.4 km/hr.
  i.   Calculate the application rate in l/ha for this sprayer. [3 marks]
  ii.   If atrazine is to be sprayed in this field at a rate of 2.5 litres per ha. How many litres of atrazine will be required will be needed for the 380 litre tank? [4 marks]

Question 4B

a) Differentiate between renewable and non-renewable energy sources. [4 marks]
b) Define an energy audit. [2 marks]
c) Explain energy hybrid systems and give their advantages. [8 marks]
d) What factors would you consider before deciding on an energy source to adopt at a farm? [6 marks]

Question 5B

a) Describe the function of each of the following components of an ignition system:
   i. Battery [2 marks]
   ii. Spark plug [2 marks]
   iii. Distributer [2 marks]
   iv. Contact breaker point [2 marks]
   v. Coil [2 marks]
b) Explain the possible causes of the following types of smoke in diesel engines:
   i. White smoke. [3 marks]
   ii. Black smoke. [3 marks]
   iii. Blue smoke. [2 marks]

End of Examination Paper