Requirements for this paper:					
Multiple-choice cards:		**Non-programmable calculator:**	X	**Open book examination:**	
Grid paper:		**Laptop:**			

EXAMINATION:	FINAL EXAMINATION 1	**PROGRAMME:**	Dip.
MODULE CODE:	NAGE51214	**DURATION:**	3 HOURS
MODULE DESCRIPTION:	AGRICULTURAL ENGINEERING	**MARKS:**	100
EXAMINER(S):	MAXWELL CHIMBUNDE	**DATE:**	
MODERATOR(S):	PROF AHMED MOHAMED	**TIME:**	

INSTRUCTIONS:

- Answer ALL questions.
- Show all calculations and working.

QUESTION 1

(I)DEFINE AGRICULTURAL MECHANISATION.

2 MARKS

(II)DESCRIBE 4 KEY FACTORS TO CONSIDER WHEN SELECTING AGRICULTURAL MACHINERY FOR A PARTICULAR FARM ACTIVITY.

8 MARKS

QUESTION 2

(i)WHAT ARE THE PRIMARY FUNCTIONS OF A TRACTOR IN AGRICULTURAL OPERATIONS?

15 MARKS

(ii) HOW CAN MECHANISATION IMPROVE LABOUR PRODUCTIVITY ON A FARM?

10 MARKS

QUESTION 3

(I)A FARMER USES A BLOCK AND TACKLE PULLEY SYSTEM TO LIFT A HEAVY LOAD OF 600KG.

THE PULLEY SYSTEM HAS 4 SUPPORTING ROPES.

a) CALCULATE THE MECHANICAL ADVANTAGE
b) DETERMINE THE FORCE REQUIRED TO LIFT THE LOAD

4 MARKS

(II) FROM QUESTION 3(I) ABOVE, IF THE ACTUAL FORCE MEASURED TO PULL THE LOAD IS 1600N CACULATE THE EFFICIENCY OF THE PULLEY SYSTEM?

3 MARKS

(III) IF THE LOAD IS LIFTED TO A DISTANCE OF 3M CALCULATE THE WORK DONE BY THE PULLEY

3 MARKS

(10 MARKS)

QUESTION 4

(I)WHAT ARE THE THREE MAIN FACTORS THAT INFLUENCE THE DESIGN OF FARM BUILDINGS?

3 MARKS

(II)WHAT ARE THE KEY COMPONENTS THAT SHLOULD BE INCLUDED IN THE PLANS AND SPECIFICATIONS OF A FARM BUILDING?

7 MARKS

(10 MARKS)

(III) A FARMER WANTS TO CONSTRUCT TRACTOR AND IMPLEMENT STORAGE SHED THAT IS 30M LONG AND 9M WIDE. THE THICKNESS OF THE CONCRETE FLOOR MUST BE 300MM. THE SHED MUST BE 4M HIGH AND HAS A FLAT ROOF. THE SIZE OF BRICKS TO BE USED ARE 300MM LONG BY 50MM WIDE BY 80MM THICK.

a. CALCULATE THE MINIMUM VOLUME OF CONCRETE REQUIRED?

5 MARKS

b. CALCULATE THE NUMBER OF BRICKS REQUIRED GIVEN THAT THE SLIDING GATE IS 3.5M HIGH BY 8M WIDE?

5 MARKS

QUESTION 5

(I)WHAT ARE THE MAIN TYPES OF IRRIGATION SYSTEMS USED IN AGRICULTURE?

5 MARKS

(II)CALCULATE IRRIGATION WATER REQUIREMENT FOR A CROP IF ETc IS 5MM/DAY AND IRRIGATION EFFICIENCY IS 75%

1 MARKS

(III)WHAT ARE THE STEPS IN DESIGNING AN IRRIGATION SYSTEM?

10 MARKS

(IV) CALCULATE THE REQUIRED CAPACITY OF AN IRRIGATION PUMP IF THE TOTAL AREA TO BE IRRIGATED IS 5HA, AND THE WATER REQUIREMENT IS 6MM/ DAY? ASSUME IRRIGATION IS DONE 8HOURS A DAY

5 MARKS

(V)DESCRIBE TWO IRRIGATION SCHEDULING TECHNIQUES AND THEIR BENEFITS.

4 MARKS

(25 MARKS)

QUESTION 6

(I) NAME THREE COMMON PRIMARY TILLAGE IMPLEMENTS

3 MARKS

(II) DRAW AND LABEL THE MAIN COMPONENTS OF A MOULDBOARD PLOUGH

3 MARKS

(III) LIST THE ADVANTAGES AND DISADVANTAGES OF USING A MOULDBOARD PLOUGH

2 MARKS

(IV) IN WHAT SITUATION WOULD A FARMER USE A DISC PLOUGH OVER A CHIESEL OR MOULDBOARD PLOUGH? **2 MARKS**

(10 marks)
