**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS FOR THE DEGREE IN SCIENCE IN CONSTRUCTION MANAGEMENT**

**2ND YEAR 2ND SEMESTER 2023/2024 ACADEMIC YEAR**

**CENTRE: MAIN CAMPUS**

---

**COURSE CODE: TCB 1308**

**COURSE TITLE: CONSTRUCTION PLANT AND EQUIPMENT**

**EXAM VENUE:** **STREAM: BSc CONSTRUCTION MGT**

**DATE: ../04/2024** **EXAM SESSION:**

**DURATION: 2HOURS**

---

**Instructions**

1. **Answer all questions in section A (Compulsory) and ANY other two questions in section B**
2. **Candidates are advised not to write on question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

**SECTION A: Answer all questions in this section (30 Marks)**

**QUESTION ONE (10 Marks)**

a) Below is a diagram of engine cylinder. Use it to answer the questions that follow. (5 Marks)

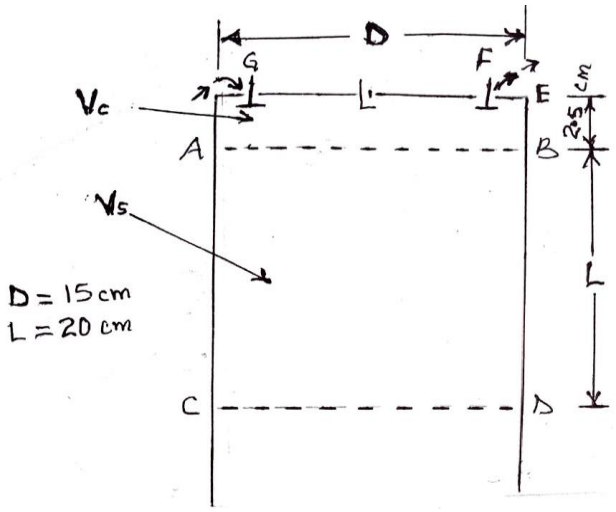



**Fig Q 1(b)**

i. The part marked F is called?

ii. The part marked G is called?

iii. Name the part marked $V_c$

iv. The letter D represents?

v. The letter L represents?

b) Define the following (5 Marks)

i. Plant
ii. Machine
iii. Tool
iv. Salvage Value
v. Payload

**QUESTION TWO (20 Marks)**

a) Below is one of equipment used for construction works. Answer the questions below with reference to the equipment (4 Marks)


i. Name the equipment (1 Mark)
ii. Based on purpose or work done, this type of machine is classified as? (1 Mark)
iii. What type of work is the equipment best suited to work? (2 Marks)

b) Below is an off-road dump truck. With reference to this truck, answer the questions that follow


i. As a construction manager, under what work conditions would you employ this equipment in your work fleet? (4 Marks)
ii. What can you consider as some major disadvantages of this machine (3 Marks)

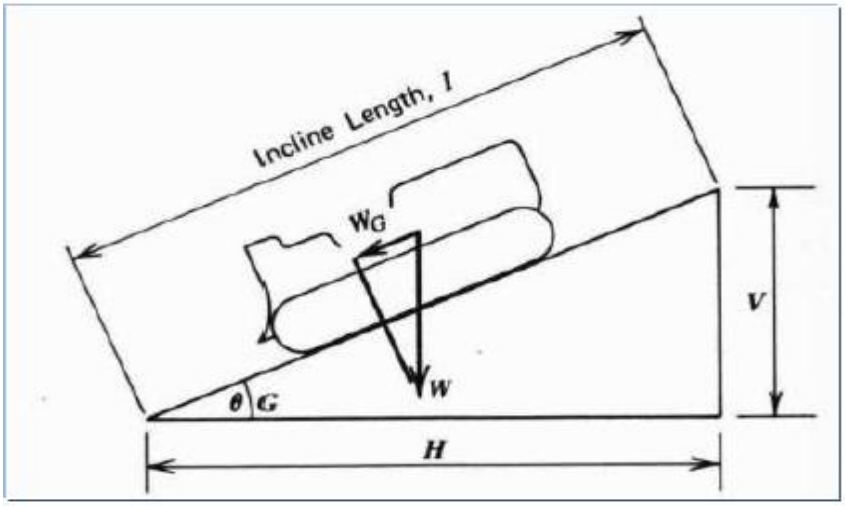
c) Machine power can be categorized as ***required power***, ***available power*** and ***usable power***. In very brief discussion show how these three differ. (6 Marks**)**

i. Required Power:

ii. Available power:

iii. Usable power:

d) The figure given below shows a construction plant of weight W Newtons moving up a slope of grade of G%. Given that G is 9% and mass of 22 metric tons, calculate the grade resistance ($F_{GR}$) (3 Marks)




**QUESTION THREE (20 Marks)**

Machinery is acquired expensively to execute work, pay back for its cost and earn profit. Ability to pay for its cost and earn profit will depend on effective management during its utilization. Effective utilization is measured by the number of hour per day the machine is put to useful work which then turns to hours per year of economic life. In ***planning owning and utilization*** of equipment, a number of factors are considered as enumerated below. Discus each of these factors

a) Quantity of work (4 Marks)

b) Output and Capacity of Equipment (4 Marks)

c) Utilization and Economic Life (4 Marks)

d) Equipment Operation Planning (4 Marks)

e) Manpower Planning ( 4 Marks)

**QUESTION FOUR (20 Marks)**

a) Discuss briefly the following different lives of a construction machinery

i. Economic Life (4 Marks)

ii. Profit Life (3 Marks)

iii. Physical life (3 Marks)

b) The initial cost of a piece of construction equipment (pneumatic tire mounted) is Ksh 5,500,000. The estimated salvage value of the equipment is Ksh 900,000 and the useful life of the equipment is 10 years. The machine will operate 2000 hrs per year. The cost of one set of tires is Ksh 400,000 and a new set of tires will be replaced after every 3 years of operation. A major repair work will be carried out on the equipment at the end of year 6 at a cost of Ksh 450,000. The company's cost of capital is 8% per year. Compute the total cost per hour for the construction equipment considering time value of money (10 Marks)

**QUESTION FIVE (20 Marks)**

When a company wins tender to undertake a given construction work, the management often faced with the decision of securing machinery for assignment in the project. Below are some basic methods through which the company may acquire the machines. Discuss each of the methods, showing clearly the advantages and disadvantages of each

a) Purchase (ownership) (6 Marks)

b) Renting (8 Marks)

c) Leasing (6 Marks)

**QUESTION SIX (20 Marks)**

a) By use of a table, give a comparison between four and two stroke IC engines (10 Marks**)**
b) Discus the principle of operation of a two-stroke internal combustion engine including its cycles of operation (10 Marks)