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**Higher National Diploma in Technology (Agriculture)**  
**First Year, First Semester Examination - 2017**  
**AG 1107 Farm Power, Energy and Mechanization**

**Instruction for candidates**

Answer all questions.

Part I and part II will be collected after one hour,  
and answer on the paper itself

Index number .....

No of pages : 07

No of question: 07

Time: **There (03) hours**

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**Part I**

**Question 01**

Underline the most appropriate answer.

- (i). Anoma throws a ball with a force of 63 N to a distance of 25 m. Janani throws the ball with the same amount of force, but the ball only goes 17 m. What can be said about “Work” done by the both girls ?
- a). They do the same amount of work.
  - b). The work done by Janani is greater than Anoma
  - c) The work done by Anoma is greater than Janani
  - d.) Neither girl does any work.
- (ii). Select the correct statement
- a) Time has direction and magnitude
  - b) Mass has direction and magnitude
  - c) Force has magnitude but no direction
  - d) Displacement has both magnitude and direction
- (iii). Select the relevant simple machine to the “Inclined plane”
- a). Wedge
  - b.) Wheel & axle
  - c). Lever
  - d.) Pulley

- (iv). With the help of simple machine 100 N of load has lifted by 20 N of effort. Mechanical Advantage of the machine is  
 a) 2000 N    b) 2 KN    c) 5 N    d) 5
- (v). Which one is considered as a good insulator  
 a) Ebonite    b) Silicon    c) Copper    d) Gold
- (vi). We can reduce the resistance of in an electric circuit  
 a) by increasing the diameter of the conductors  
 b) by increasing the length of the conductors  
 c) by decreasing the diameter of the conductors  
 d) by increasing the temperature of the conductors
- (vii). Select the correct statement/s relevant to internal combustion engine.  
 1. It is the engine designed to derive its power from the fuel, burnt within the engine cylinder.  
 2. It is the engine designed to derive its power from the fuel, burnt outside the engine cylinder.  
 3. It is combustion of fuel and generation of heat takes place within the cylinder of the engine.  
 4. It is combustion process uses heat in the form of steam, which is generated in a boiler, placed entirely separate from the working cylinder.  
 a) 1 and 2 only    b) 1 and 3only    c) 2 and 4 only    d) 1,2,3 and 4
- (viii). Select the correct stroke order for four stroke engine  
 a) induction, power, exhaust, and compression  
 b) induction, compression , power, and exhaust  
 c) compression, power, induction, and exhaust  
 d) exhaust, power, induction, and compression
- (ix). Engine **bore** is,  
 a) the linear distance traveled by the piston from Top dead center to Bottom Dead Centre.  
 b) the diameter of the engine cylinder  
 c) the cross section area of the cylinder  
 d) the ratio of total cylinder volume to clearance volume

- (x). Among the operations given below which operation is occurred at the end of the four stroke compression ignition engine.
- Just before the ending of the stroke spark plug emits an electric spark
  - When piston reaches TDC high pressurized fuel is injected in to the cylinder
  - Pure air comes into the cylinder through inlet valve
  - As volume increases the pressure inside the cylinder decreases
- (xi). The common fuel for external combustion engines is,
- coal
  - kerosene
  - firewood
  - burnet engine oil
- (xii). Among the lubricants given below which one is considered as a semi solid lubricant
- SAE 90 oil
  - Grease
  - Graphite
  - Mica
- (xiii). In a carburetor, Choke valve is placed
- before the venture
  - In the venture
  - after the venture
  - same side of the throttle valve placed
- (xiv). With the help of hydraulic systems
- the force can be multiplied and transmitted
  - the force can be multiplied only
  - The mechanical energy is converted into pressure energy and electrical energy respectively
  - None of the above
- (xv). The components of power transmission system are given below, which one is facilitated around  $90^{\circ}$  angle power transmission
- Clutch
  - Gearbox
  - Propeller shaft
  - Differential
- (xvi). The energy sources are given below which one is considered as a renewable energy source?
- Coal
  - LP gas
  - Diesel
  - Bio diesel

**(Total 16 marks)**

**Part II**

**Question 02**

- (i) The “figure 1” explains movement of common simple machine. Named  $F_i$ ,  $F_o$ ,  $X_i$  and  $X_o$  (2 marks)

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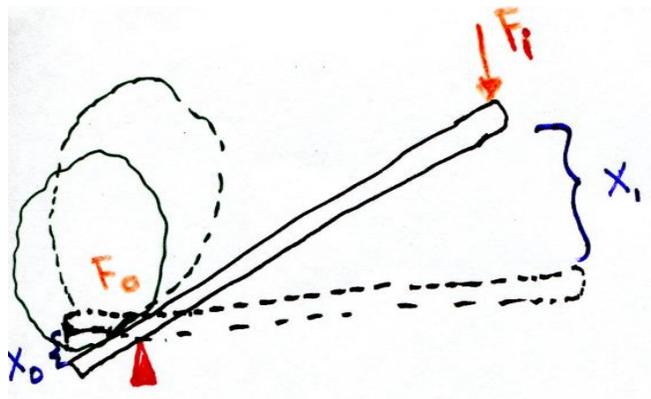


Figure 1

- (ii) If  $F_i$ ,  $F_o$ ,  $X_i$ ,  $X_o$  are 0.5N,,8N,5m and 0.25m respectively. Calculate Mechanical Advantage, Velocity Ratio and Efficiency (6marks)

Mechanical Advantage

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Velocity Ratio.....

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Efficiency

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.....

(iii) Machine efficiency is never reached 100%. “Comment” on the statement (4 marks)

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**(Total 12 marks)**

**Question 03**

(i) Write two (2) reasons to emit black exhaust gas (smoke) from 45 Hp diesel tractor(4 marks)

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(ii) Give examples for the vehicles which are having followings types of engines. (4 marks)

1. External Combustion engine.....
2. Compression Ignition 4 – Stroke Cycle engine.....
3. Spark Ignition 4 – Stroke Cycle engine.....
- 4) Spark Ignition 2 – Stroke Cycle engine.....

(iii) Write four (4) functions of lubricant. (4 marks)

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**(Total 12 marks)**

### Part III

#### Question 04

- (i) Discuss the important of thermostat valve in the pump assisted cooling system. (3 marks)
- (ii) Write three (3) information which should be displayed on the tractor tire. (3 marks)
- (iii) Write components of hydraulic brake system. (3 marks)
- (iv) Describe **Compression stroke** of four stroke petrol engine. (6 marks)

**(Total 15 marks)**

#### Question 05

- (i) Discuss the principle behind hydraulic system. (4 marks)
- (ii) Describe the function of following. (5 marks)
  - a) Differential lock**
  - b) Cultch**
- (iii) Make a comparison of petrol and diesel fuel system. (6 marks)

**(Total 15 marks)**

#### Question 06

- (i) Define the laws of friction. (4 marks)
- (ii) Describe followings with two (2) suitable examples; (6 marks)
  - a) Force**
  - b) Vector Quantity**
- (iii) State four (4) relationships between **displacement, velocity, acceleration and time** using related symbols. (5 marks)

**(Total 15 marks)**

#### Question 07

- (i) Write the components of battery ignition system (4 marks)
- (ii) Write short notes of followings.
  - a) Renewable energy** (6 marks)
  - b) Power take off shaft (PTO)** (5 marks)

**(Total 15 marks)**

