



**FEDERAL UNIVERSITY OYE-EKITI**  
DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING  
ENGINEERING MATHEMATICS I, ENG 201  
FIRST SEMESTER EXAMINATION

Academic Session: 2018/2019

Course Unit: 3

Time Allowed: 3 Hours

Exam Date: 15<sup>th</sup> June, 2019.

Instruction: Answer Five Questions in all, 2 questions from section A & 3 questions from section B.  
[SECTION A]

Answer All the Questions in this Section.

**QUESTION ONE**

- (a) Solve the equations:  $x(y+z) = a$ ,  $y(z+x) = b$ , and  $z(x+y) = c$ . [10mks]  
(b) If  $a$ ,  $b$ ,  $c$  form the sides of a triangle ABC, show that the solution in (a) above can be expressed in the form:  
$$x \cot(\frac{1}{2})A = y \cot(\frac{1}{2})B = z \cot(\frac{1}{2})C = \pm \sqrt{S}$$
, where  $S$  is the semi-perimeter of the triangle. [8mks]  
(c) If  $\Delta$  denotes the area of triangle ABC in (b) above, calculate the value of  $\Delta$  to the nearest whole number, given that  $x = 2.5\text{cm}$ ,  $y = 3.2\text{cm}$  and  $z = 4\text{cm}$ . [6mks]

**QUESTION TWO**

- (a) Solve the equations:  $yz = py + qz$ ;  $zx = qz + rx$ ; and  $xy = rx + py$ . [10mks]  
(b) Show that the solution of the differential equation:  $x^2 - 3y^2 + 2xyy' = 0$  is  $y = x\sqrt{8x+1}$  given that  $y(1) = 3$  [8mks]  
(c) Evaluate  $\int \cos^{-1}x dx$  [6mks]

[SECTION B]

Answer Only Two (2) Questions from this Section.

**QUESTION THREE**

- (a) Solve the equation:  $x^5 + x^4 - 3x^3 - 9x^2 - 14x - 8 = 0$  [8mks]  
(b) If  $c = a(x,y) + b(x,y) - d(x,y)$  represents the solution to an inexact differential equation given as:  
$$y(1+xy)dx + x(1+xy+x^2y^2)dy = 0$$
, obtain the values of  $a$ ,  $b$  and  $d$ , and hence an expression for  $c$ . [8mks]  
(c) Use Cauchy's integral test to determine the convergence or divergence of the series:  $\frac{1}{2 \cdot 3} + \frac{2}{3 \cdot 4} + \frac{3}{4 \cdot 5} + \dots$   
[8mks]

**QUESTION FOUR**

- (a) Prove that if  $x + \frac{1}{x} = y + 1$ , then  $\frac{(x^2 - x + 1)^2}{x(x-1)^2} = \frac{y^2}{y-1}$ . Hence, solve the equation:  
$$(x^2 - x + 1)^2 - 4x(x-1)^2 = 0$$
 [8mks]  
(b) Investigate the Convergence or Divergence of the series:  $\sum_{n=1}^{\infty} \frac{n}{\sqrt[3]{8n^3 + n^2 - 24}}$  [8mks]  
(c) Given that  $y(0) = 1$ , obtain the solution of the differential equation:  $(x^2 + 1)dy = (y^2 + 1)dx$  [8mks]

**QUESTION FIVE**

- (a) Given that  $y(0) = -1$ , obtain the solution of the differential equation:  $y' \cos x + y \sin x = y^3 \cos^2 x$  [8mks]  
(b) Determine the range of values  $x$  for which the series:  $\frac{(x-2)}{1} + \frac{(x-2)^2}{2} + \frac{(x-2)^3}{3} + \dots$  is convergent or divergent. [8mks]  
(c) Investigate the differential equation for exactness:  $x^2 y' - y' = x^3 y$ . Hence, find its solution given that  $y(0) = 1$ . [8mks]



**FEDERAL UNIVERSITY OYE-EKITI**  
**FACULTY OF ENGINEERING**  
**DEPARTMENT OF MATERIALS AND METALLURGICAL ENGINEERING**

## **MATERIALS AND METHODS**

### **First Semester Examination 2018/2019 Session**

**First Semester Exam**  
**Course Title:** ENGINEERS IN SOCIETY **Course Code:** ENG 205 **Unit:** 1.0  
**Instruction:** Answer one question from each section **Time Allowed:** 1 Hour

## Section A

- Section A**

  - 1a. Define science according to Pytlak et al., (1985), hence enumerate the division of science.
  - b. "Technology refers to machines (hardware) and management practices (software) needed to achieve a production target whether goods or services", hence list the Technology that is involved in typical soap manufacturing company.
  - 2a. As an Engineering student, give a comprehensive description of Engineering profession.
  - b. Classify Engineering family according to COREN
  - c. Draw a typical chain of command in an engineering outfit where different members of the engineering family are at work.

## Section B

- 3 Complete the following terms used in *elements of a safety program*:

- Safety ----- (i) -----
  - Hazard ----- (ii) -----
  - ----- (iii) ----- work practices
  - Safe work ----- (iv) -----
  - Company ----- (v) -----
  - ----- (vi) ----- protective equipment
  - ----- (vii) ----- maintenance
  - Training and ----- (viii) -----
  - ----- (ix) ----- and reporting
  - Emergency ----- (x) -----

- Emergency ----- (x) -----

4. Complete the following missing terms in factors of *indirect and hidden costs in the iceberg analogy of financial benefits*:

- Time loss of ----- (i) ----- worker
  - Loss of ----- (ii) ----- power
  - Economic loss to ----- (iii) -----
  - Lost time by fellow ----- (iv) -----
  - Loss of ----- (v) ----- crew break-up
  - Time damaged tool out of ----- (vi) -----
  - Spoiled ----- (vii) -----
  - Spoilage - fire, water, and ----- (viii) -----
  - Failure to fill ----- (ix) -----
  - Overhead costs during ----- (x) -----

## Section C

- 5a. What are the aims and objectives of engineering ethics?

- b. Enumerate the areas of specialisation of **one** of the following:



- 6a. List five responsibilities of an engineer to the profession

- b. Mention three career opportunities in each of these engineering professions:

- b. Mention three career opportunities in each of these fields i. Civil Engineering ii. Materials & Metallurgical Engineering iii. Electrical & Electronics Engineering



FEDERAL UNIVERSITY OYE-EKITI

FACULTY OF ENGINEERING

2018/2019 SESSION FIRST SEMESTER EXAMINATION

WORKSHOP TECHNOLOGY MEE 201

Time: 2 hours

Answer any Three Questions

**QUESTION ONE**

(a) Explain with five reasons why industrial safety is very important in mechanical workshop (4marks)

(b) Describe any three of the following hand tools with sketch diagram (6marks)

- i. Hacksaw      ii. File      iii. Bench vice      iv. Hammer

(c) With a sketch diagram, describe any three of the following measuring tools? (6marks)

- i. Vernier caliper  
ii. Inside caliper  
iii. Outside caliper  
iv. Engineer's protractor  
v. Outside micrometer

(d) State four uses of metal cutting fluids (4marks)

**QUESTION TWO**

- a. What is workshop Technology (4marks)  
b. Write short notes on the following production processes: i. Job production ii. Batch production and iii. Mass production (6marks)  
c. Briefly explain three methods of joining metal, stating one of its advantages and disadvantages (9marks)  
d. Sketch FUOYE University main workshop, and identify how various machines are installed (6marks)

**QUESTION THREE**

- a. Lathe machine is believed to be the mother of all machines. Discuss (5marks)  
b. Sketch a lathe machine, and label five principal parts. (7marks)  
c. Write short notes on four components of a lathe machine (8marks)  
d. What is the significant of sheet metal in the workshop (5marks)

**QUESTION FOUR**

- a. Describe three advantages of a good workshop layout (6marks)  
b. Write short notes on two types of workshop layout (4marks)  
c. Differentiate between a lathe machine and a milling machine (5marks)  
d. In a tabular form, enumerate five differences between hard wood and soft wood (10mks)



FEDERAL UNIVERSITY, OYE-EKITI  
DEPARTMENT OF MECHANICAL ENGINEERING  
B. Eng DEGREE EXAMINATION  
FIRST SEMESTER 2018/2019 ACADEMIC SESSION  
COURSE TITLE: ENGINEERING MECHANICS (MEE203)

UNITS : 3

TIME ALLOWED: 3 Hours

**Instruction:** Answer Five Questions (AT LEAST TWO QUESTIONS FROM EACH SECTION).

**SECTION A: STATICS**

1(a) Determine the magnitude and orientation of the Force  $F$  shown in Fig.1 so that the particle is in Equilibrium. 10 marks

(b) The mast head fitting supports the two forces as shown in figure 2 (Fig.2). Determine the magnitude of  $T$  which will cause no bending of the mast at point O. 10 marks

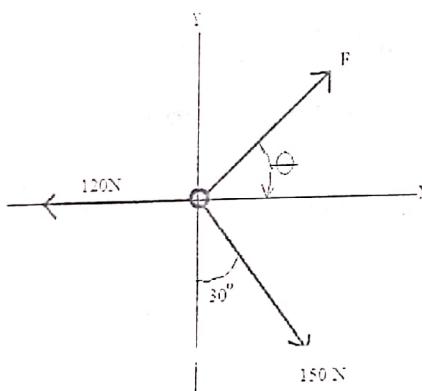


Fig.1

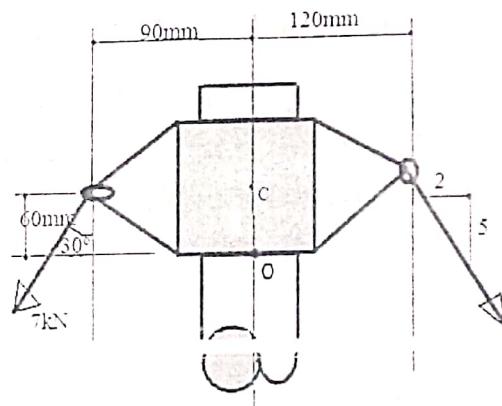


Fig.2

2(a). A uniform lamina shown in Fig. 3 consists of a rectangle, a semi-circle and a triangle. Determine the centre of gravity of the lamina with respect to the given axis. 12 marks

(b) Determine the centroid of the sector of a circle. Take x-axis as the axis of symmetry and the angle subtended is  $2\alpha$ . 8 marks

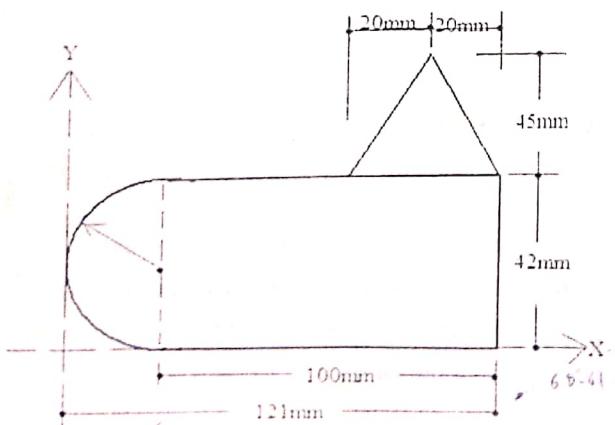


Fig.3

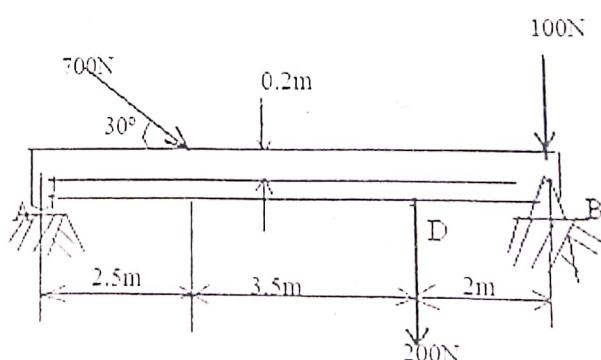


Fig.4

3a. Determine the horizontal and vertical components of reaction for the beam loaded as shown in figure 4 (Fig.4). Neglect the weight of the beam in the calculations. 8 marks

b. Determine the moment of inertia of the channel section shown in figure 5 (Fig.5) about a horizontal axis through its centroid. 12 marks

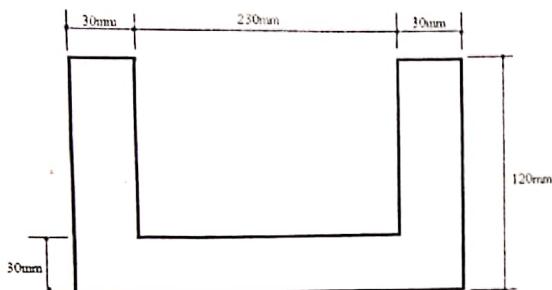


Fig.5

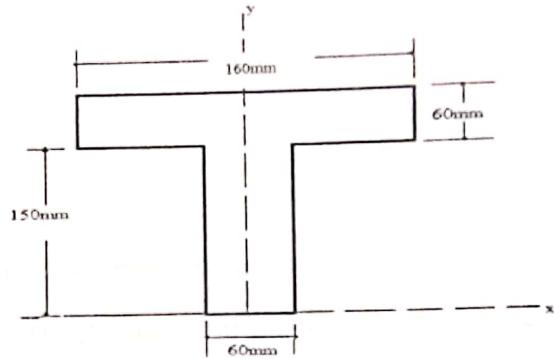


Fig.6

4a. Find the moment of inertia of a T-section (Fig.6) with flange as 160mm x 60mm and web as 150mm x 60mm about X-X axis through the center of gravity of the section. 12 marks

b. Determine the mass moment of inertia of a cone about z-axis (Fig.7). Assuming the cone is made of a uniform material of density  $\rho$ . 8 marks

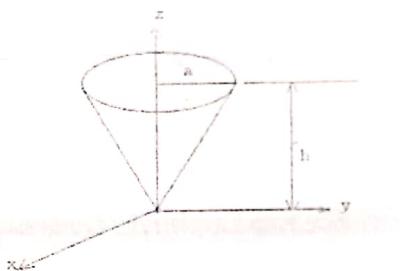


Fig.7

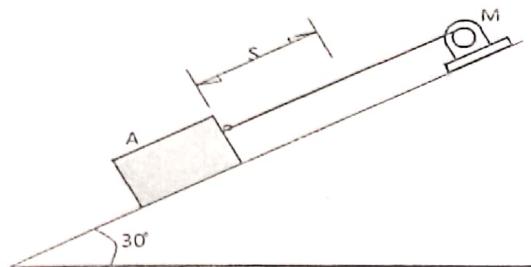


Fig.8

## SECTION B: DYNAMICS

5(a) The velocity of a particle which moves along the s-axis is given by  $v = 2 - 4t + 5t^{3/2}$ , where t is in seconds and v is in meter per second. Evaluate the position S, velocity V, and acceleration a when t=3s. The particle is at the position  $S_0=3\text{m}$  when t=0. 8marks

b. A particle moves along the x-axis with an initial velocity  $V_x = 50\text{m/s}$  at the origin when t=0. For the first 4 seconds it has no acceleration thereafter it is acted on by a retarding force which gives it a constant acceleration  $a_x = -10\text{m/s}^2$ . Calculate the velocity and the x- coordinate of the particle for the conditions of t=8s and t=12s and find the maximum positive x-coordinate reached by the particle. Represent the path taken by the particle on a v-t diagram. 12marks

6a. At a given instant, a car travels along a circular curved road with a speed of 22m/s while decreasing its speed at the rate of  $3\text{m/s}^2$ . If the magnitude of the car's acceleration is 5m/s, Determine the radius of curvature. 8marks

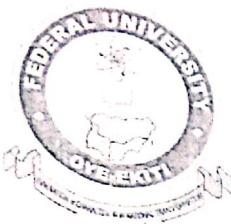
b. The motor (Fig. 8) winds in the cable with a constant acceleration, such that the 20kg crate moves a distance  $S=6\text{m}$  in 3s, starting from rest. Determine the tension developed in the cable. The coefficient of kinetic friction between the crate and the plane is  $\mu_k = 0.3$ . 12marks

7. A flywheel rotating freely at 1080rev/min clockwise is subjected to a variable counterclockwise torque which is first applied at time  $t=0$ . The torque produces a counterclockwise angular acceleration  $\alpha = 4t \text{ rad/s}^2$ , where  $t$  is the time in seconds during which the torque is applied. Determine

(i) the time required for the flywheel to reduce its clockwise angular speed to 800rev/min

(ii) the time required for the flywheel to reverse its direction of rotation and

(iii) the total number of revolution, clockwise plus counterclockwise, turned by the flywheel during the first 12 seconds of torque application. 20marks



**FEDERAL UNIVERSITY OYE-EKITI  
FACULTY OF ENGINEERING  
DEPARTMENT OF MECHANICAL ENGINEERING**  
**2018/2019 FIRST SEMESTER EXAMINATION**

**COURSE TITLE:** Thermodynamics I

**CODE:** MEE205  
**UNITS:** 2.0

**TIME ALLOWED:** 2 Hours

**CLASS:** 200 Level (ALL Engineering & FST Students)

**INSTRUCTIONS:** Answer **SECTION A** and any three (3) questions in section B

**SECTION A**

**Answer all questions**

1. \_\_\_\_\_ law of thermodynamics states that the heat supplied to a system is equal to the change in its internal energy plus the work done by the system.
2. \_\_\_\_\_ process occurs when the properties of a system are varied at constant heat.
3. \_\_\_\_\_ is all the matter enclosed within a specified space whose characteristics can be varied and measured,
4. \_\_\_\_\_ is a substance that is capable of absorbing heat from a source and rejecting it to a heat sink.
5. \_\_\_\_\_ is a body having a higher heat capacity than another body ~with which it is in thermal contact and heat transfer can take place between the two bodies.
6. \_\_\_\_\_ is a body having a large heat capacity, part of which can be transferred to another body to keep it at a constant temperature.
7. \_\_\_\_\_ is a line, which may be real or imaginary that defines the limit or outline of a system.
8. \_\_\_\_\_ is any observable characteristics of a system that can be identified, measured and varied in any required manner.
9. \_\_\_\_\_ is a body that is capable of receiving heat from another body that has a higher capacity and with which it is in thermal contact.
10. \_\_\_\_\_ is a system that absorbs heat from an external low temperature source and rejects it completely without converting any part of it to work.
11. \_\_\_\_\_ is all matter that lies immediately outside the boundary and interacts with it.
12. \_\_\_\_\_ property is directly proportional to the quantity of matter in the system.
13. \_\_\_\_\_ Pro perty is independent of the quantity of matter in the system.
14. The of a system at any given instant is its condition, which is fullydefined by specifying its properties.
15. A flow or open system allows \_\_\_\_\_ and \_\_\_\_\_ to flow in and out of the system.
16. \_\_\_\_\_ is a process or sequence of processes in which the initial and final states of the system are the same.

17. \_\_\_\_\_ is defined as the total heat absorbed by a system at constant pressure. It is the sum of the internal energy and flow work.
18. The efficiency of an Otto cycle depends on \_\_\_\_\_.
19. \_\_\_\_\_ is a measure of the degree of disorderliness or randomness of a system.
20. The cycle also called the constant pressure cycle because the heat addition is undertaken at constant pressure.

## SECTION B

Answer any three (3) questions

### QUESTION ONE

(a). Explain clearly the differences between the following pairs of terms

- i. Adiabatic process and isothermal process
- ii. Turbine and compressor
- iii. Compressor and pump
- iv. Nozzle and diffuser

(b). Calculate the polytropic exponent, the final volume, the work of compression and heat interaction if 6 kg of air at an absolute pressure of 200 kPa and temperature of 400K is compressed polytropically until the pressure and temperature rises to 2500 kPa and 1000K respectively. Take gas constant  $R = 287 \text{ J/kgK}$ .

### QUESTION TWO

(a). Define the following terms: (i) Stored energy, (ii) Transitional energy, (iii) flow process and (iv) Flow work.

(b). A mass of an ideal gas is enclosed in a piston-cylinder arrangement. The gas is compressed reversibly in such a manner that the pressure and volume are related to one another by the expression  $pV^n - \text{constant}$ , where  $n$  has a constant value of 1.4. If the initial pressure and volume of the gas are  $200 \text{ kN/m}^2$  and  $1\text{m}^3$  respectively and the final volume is  $0.125\text{m}^3$ .

Determine:

- i. The final pressure of the gas
- ii. The work done during the process
- iii. Sketch the process on a p-V

### QUESTION THREE

(a). What do you understand by each of the following concept as applied to the study of thermodynamics?

- i. The first law of thermodynamics

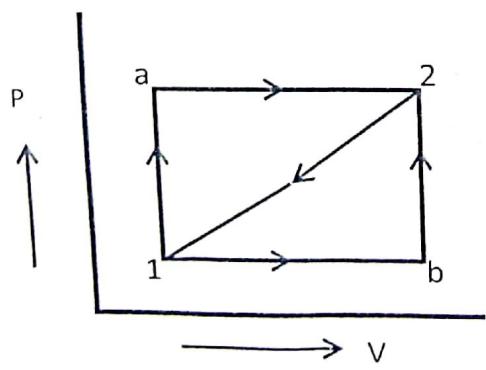
- ii. The principle of conservation of energy  
 iii. The perpetual motion machine of the first order

(b). Complete the perfect gas process – relation

Process	Volume	Pressure	Constant temperature	Polytropic	Reversible Adiabatic or Isentropic
Law	$B$				
P, V, T. relation	$P_1 V_1 / T_1$				
Change in internal energy $\Delta U$					
Work transfer W $= \int pdv$					
Heat transfer Q					
Change in entropy $\Delta S = S_2 - S_1$					

#### QUESTION FOUR

- (a). Define the following terms: (i) Stored energy, (ii) Transitional energy, (iii) flow process and (iv) Flow work.
- (b). Consider a system taken from state 1 to state 2 along the path 1-9-2; 100kJ of heat flows into the system and the system does 40 kJ of work.
- Evaluate the heat that flows into the system along the path 1-b-2 if it is accompanied by 20kJ of work transfers from the system.
  - Calculate the work done and heat exchange if the system returns to the initial state 1



$$\begin{aligned}
 Q + w &= \Delta u \\
 \int pdv &= \int v dw \\
 w &= \int C_v dv \\
 Q &= \Delta u + \int C_p dv
 \end{aligned}$$



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**FEDERAL UNIVERSITY OYE-EKITI  
FACULTY OF ENGINEERING  
DEPARTMENT OF MECHANICAL ENGINEERING  
2018/2019 FIRST SEMESTER EXAMINATION**

**COURSE TITLE:** Thermodynamics I

**CODE:** MEE205

**TIME ALLOWED:** 2 Hours

**UNITS:** 2.0

**CLASS:**

200 Level (ALL Engineering & FST Students)

**INSTRUCTIONS:** Answer **SECTION A** and any three (3) questions in section B

**SECTION A**

1. \_\_\_\_\_ is the energy transferred between a system
2. If a system changes its state and passes through a continuous series of thermodynamic equilibrium states such that both the system and its surroundings can be restored to their original state such a process is called \_\_\_\_\_
3. \_\_\_\_\_ refers to any form of energy which is transferred between a system and its surrounding.
4. The flow of a mass of fluid through an open system is called Free Flow
5. In a steady flow process, the rate of mass flow at any section is \_\_\_\_\_ at any other section
6. \_\_\_\_\_ is process in which the temperature of the system remains constant throughout the process process.
7. \_\_\_\_\_ is a body having a higher heat capacity than another body with which it is in thermal contact and heat transfer can take place between the two bodies.
8. \_\_\_\_\_ is a body that is capable of receiving heat from another body that has a higher capacity and with which it is in thermal contact.
9. \_\_\_\_\_ is a system that absorbs heat from an external low temperature source and rejects it completely without converting any part of it to work.
10. \_\_\_\_\_ is all matter that lies immediately outside the boundary and interacts with it.
11. A flow or open system allows Mass and Energy to flow in and out of the system.
12. \_\_\_\_\_ is a processor sequence of processes in which the initial and final states of the system are the same.
13. \_\_\_\_\_ is defined as the total heat absorbed by a system at constant pressure. It is the sum of the internal energy and flow work.
14. \_\_\_\_\_ property is directly proportional to the quantity of matter in the system.
15. \_\_\_\_\_ property is independent of the quantity of matter in the system.
16. The \_\_\_\_\_ of a system at any given instant is its condition, which is fully defined by specifying its properties.

17. \_\_\_\_\_ is a body having a large heat capacity, part of which can be transferred to another body to keep it at a constant temperature.
18. \_\_\_\_\_ is a line, which may be real or imaginary that defines the limit or outline of a system.
19. \_\_\_\_\_ is any observable characteristics of a system that can be identified, measured and varied in any required manner
20. \_\_\_\_\_ is a substance that is capable of absorbing heat from a source and rejecting it to a heat sink.

## SECTION B

### QUESTION ONE

- a) In a steady flow process, the fluid flows through a machine at the rate of 15 kg/min. Between the entrance and exit of the machine, the relevant data regarding the working fluid is

Parameter	Inlet	Outlet
Velocity	5m/s	8m/s
Pressure	100 kPa	700 kPa
Specific volume	0.45 m <sup>3</sup> /kg	0.125 m <sup>3</sup> /kg

The working fluid leaves the machine with internal energy 160 kJ/kg greater than that at entrance and during the process 7200 kJ/min of heat is lost to the surroundings. Assuming entrance and exit pipes to be at the same level, calculate the shaft work and the ratio of inlet pipe diameter to outlet pipe diameter.

- b) Air flowing steadily at the rate of 0.65kg/s enters an air compressor at a pressure 100kpa and specific volume of 0.90 m<sup>3</sup>/kg with a velocity of 7.5 m/s and leaves at a pre of 690kpa and specific volume of 0.20 m<sup>3</sup>/kg with a velocity of 4.5 m/s. The initial and final internal energy values for the air are 224 and 346 KJ/kg respectively. The cooling water around the cylinders removes 70KJ/kg of heat the air. Neglecting the change in potential energy compute. (i) the inlet pipe cross sectional area. (ii) the power required to drive the compressor.

### QUESTION TWO

- a) Briefly define the following terms  
 i) internal energy (ii) reversible process (iii) flow work (iv) stored energy transitional energy (v) non-flow process
- b) Air initially at 60 kPa pressure, 800 K temperature and occupying a volume of 0.1 m<sup>3</sup> is compressed isothermally until the volume is halved and subsequently it goes further

compression at constant pressure till the volume is halved again. Sketch the process on p – V plot and make calculations for the total work done and total heat interaction for the two processes. Assume ideal gas behaviour for air and take  $c_p = 1.005 \text{ kJ/kg K}$ .

### QUESTION THREE

- (i) Why is heat not a property of a system?
- (ii) Explain the sign convention for work and heat transfers
- a) 2 kg of an ideal gas occupies a volume of  $0.3 \text{ m}^3$  at 10 bar pressure and 500 K. When this gas expands polytropically ( $pV^{1.2} = C$ ) the internal energy decreases by Presuming adiabatic exponent  $\gamma = 1.4$ , determine : specific gas constant, final temperature, pressure and volume of gas, and heat and work interactions across the system boundary,  $p_n$  : From characteristic gas equation,  $PV = mRT$

### QUESTION FOUR

- a) What do you understand by each of the following concepts as applied to the study thermodynamics
  - (i) The principle of conservation of energy
  - (ii) The first law of thermodynamics
  - (iii)The perpetual motion machine of the first order
- b) 2 kg of an ideal gas occupies a volume of  $0.3 \text{ m}^3$  at 10 bar pressure and 500 K temperature. When this gas expands polytropically ( $pV^{1.2} = C$ ) the internal energy decreases by 300 kJ. Presuming adiabatic exponent  $\gamma = 1.4$ , determine :
  - (i) specific gas constant,
  - (ii) final temperature, pressure and volume of gas, and
  - (iii)heat and work interactions across the system boundary

### QUESTION FIVE

0.2 of air at a pressure of 400 kPa and 430K is contained inside a thermally insulated cylinder. A movable piston fitted inside the cylinder is pushed outwards to a position where the pressure is 100 kPa. During this operation, the piston assembly does not exchange any heat with the surroundings. The air then supplied heat at constant pressure till its enthalpy increases by 60 kJ. Evaluate the net work done by the gaseous system. What should be the index of expansion of a single reversible polytropic process if it is to produce the same work while operating between the same initial and final states.



FEDERAL UNIVERSITY OYE EKITI

FACULTY OF ENGINEERING

MECHANICAL ENGINEERING DEPARTMENT

FIRST SEMESTER 2018/2019 ACADEMIC SECTION

COURSE CODE: MEE207

COURSE TITTLE: ENGINEERING DRAWING I

UNIT: 1

TIME ALLOWED: 2HRS

INSTRUCTION: answer questions one and any other three questions

Question 1.

- a. i. Define Computer Aided Design (CAD).  
ii. List five (5) CAD software packages.  
iii. State the meaning of the following: CNC, CAM, CATD, CADD and CAP.  
iv. State five (5) merit of CAD over traditional engineering drawing.  
v. Explain the following, indicating the symbol to be used in each case:  
    1. First angle projection  
    2. Third angle projection. 20mks

- b. Obtain the interpenetration curve of the elevation shown in Fig.1 and develop both cylinders full size using the seams shown. 20mks

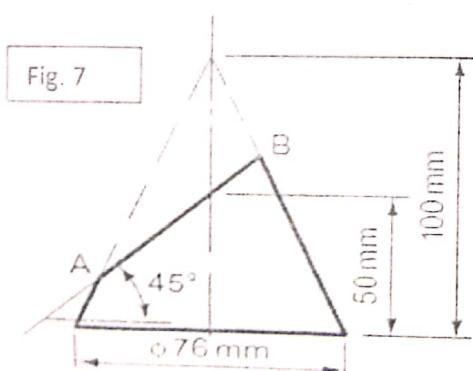
Question 2. Draw the block in Fig. 2 in isometric projection as shown. 20 mks

Question 3. Draw (i) the view from the front and (ii) the view from right of the object shown in Fig. 3 in orthographic projection 20mks

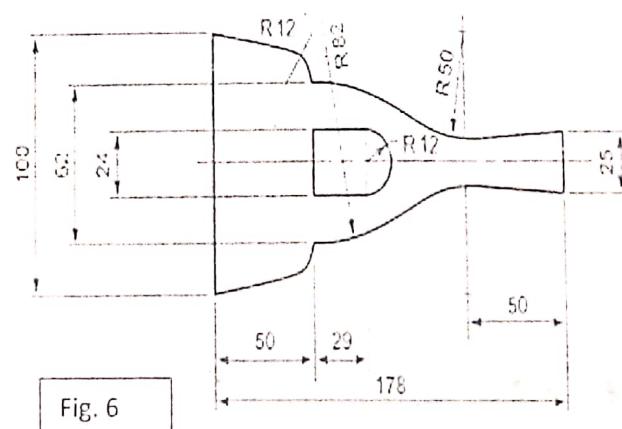
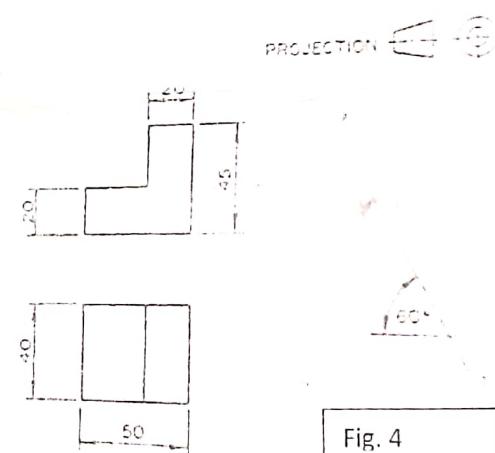
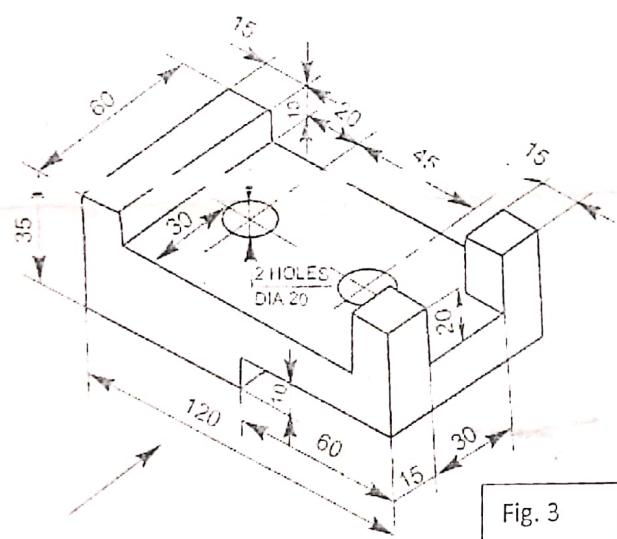
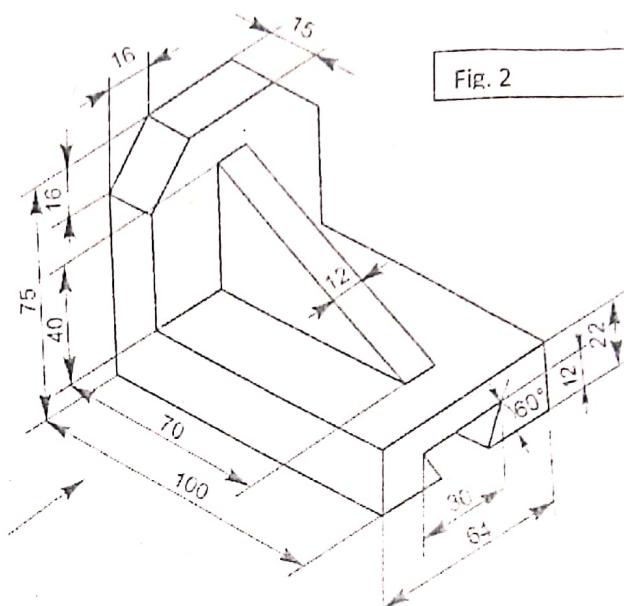
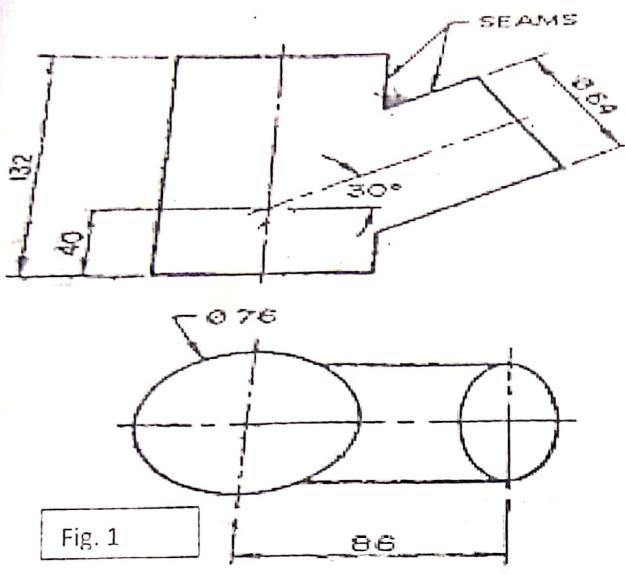
Question 4. a. Draw the given view in Fig. 4 full size and project a first auxiliary view  $X^1Y^1$ .  
b. Develop the right lateral surface of a right circular cylinder, truncated at both ends by two parallel planes and resting on ground plane on the lower cut end face, which is an ellipse, as shown in Fig. 5 20mks

Question 5. Fig. 6 shows a garden hoe. Draw this given view, full size, and show any construction lines used in making the drawing. 20mks

Question 6. Fig.7 is the frustum of a right cone. Draw this elevation and a plan. Draw the true shape of face AB. 20mks



20mks





## FEDERAL UNIVERSITY OYE EKITI

### FACULTY OF ENGINEERING

#### DEPARTMENT OF MATERIALS AND METALLURGICAL ENGINEERING

MME 201- Materials Science (2 Units)

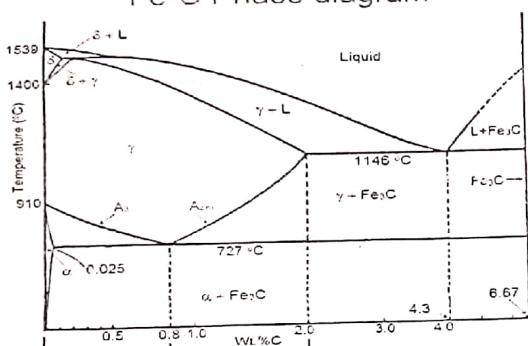
1<sup>st</sup> Semester Examination (2018/2019)

Instruction: Answer four questions

Time allowed: 2hrs

- Eutectoid steel is slowly cooled from a temperature of 780°C to a temperature just below 727°C as shown in figure below.

Fe-C Phase diagram



Determine:

- The percentage of ferrite
  - The percentage of cementite
  - Wt% of C
- Determine the number of atoms in a:
    - Simple cubic (SC) unit cell
    - Face-centered cubic cell
    - Body-centered cubic unit cell
  - Mention two:
    - types of point defects
    - types of nucleation
    - phase transformation phenomena
  - List two:
    - types of solid solutions
    - types of strengthening mechanisms
    - factors affecting diffusion
  - Outline two non-ferrous alloys
  - List two types of advanced materials
  - List one example each of a p-type and n-type semiconductor dopant
  - Enumerate the type of chemical bonding in Bronze and Polyethylene
  - List two types of bulk defect
  - List two types of magnetism



FEDERAL UNIVERSITY, OYE-EKITI  
DEPARTMENT OF MECHATRONICS ENGINEERING

B.Eng. Degree Examination  
First Semester 2018/2019 Session  
COURSE CODE: MTE201

COURSE TITLE: COMPUTER AIDED ENGINEERING 1      UNIT: 1    Time: 2 ½ Hours

**Instructions:** Answer all questions in Section 1 that contains 2 parts, then answer Two question each from section 2 and 3 respectively.

Section 1 (compulsory) answer all questions in the 2 parts;

Part 1. Programming in C Language

1. Describe the function of the *Integrated Development Environment* [2 marks]
2. List *Two* window in the *code::Block IDE* software [2 marks].
3. State *Two* Programming step [2 marks]
4. Write the *Two* ways to insert comment insert comments into a C program [2 marks]
5. Write *Two* C language keyword [2 marks]
6. State *Two* steps involve to using a variable in C programming [2 marks].
7. State *Two* data type in C programming [2 marks].
8. Write the *do* statement syntax [2 marks].
9. Describe the advantage of *program looping* [2 marks]
10. Distinguish between the *printf* and the *puts* function in C programming [2 marks].

Part 2. Introduction to MATLAB

11. State *TWO* plotting step in MATLAB [2 marks].
12. Write *TWO* MATLAB file extension [2 marks].
13. Write the MATLAB *command* for evaluating matrix *inverse* and *determinant* [2 marks].
14. Differentiate between *who* and *whos* commands associated with variables in MATLAB [2 marks].
15. Write the MATLAB command for 2D and 3D plot [2 marks].
16. Distinguish between the *format short e* and *format rat* commands in MATLAB [2 marks].
17. State the function of the *command window* and *workspace window* in MATLAB [2 marks].
18. Write the *linspace command* and *length command* syntax in MATLAB [2 marks].
19. What is the output of the command *eye (3)* and *eye (3, 4)* in MATLAB [2 marks].
20. State *TWO* axis type in MATLAB [2 marks].

## Section 2

Instruction: Answer only two question from this section

### Question One

- (a) Using the `for` statement write the source code to evaluate the 1000th term in a sequence with initial value of 1. Note your program must contain appropriate comment for readability and message at the output terminal. [5 marks].  
ii. Explain every statement you have used in (a) above. [5 marks].
- (b) Using the `puts` function write a program that prints the text I love Federal University Oye-Ekiti! [3 marks].  
[2 marks].
- (c) State the function of the modulus operator

### Question Two

- (a) Using the `scanf` function write a program that tells the user to input temperature value from the keyboard in degrees Fahrenheit (F) and convert this value to degrees Celsius (C) using the following formula:

$$C = \frac{(F - 32)}{1.8}$$

Note your program must contain appropriate comment for readability and message at the output terminal. [5 marks].  
[5 marks].

- ii. Explain every statement you have used in (a) above. [3 marks].
- (b) Write the output of the following program

```
#include <stdio.h>
```

```
int main(void)
```

```
{  
    printf("MTE201 Exam\\nOngoing at the ELT\\nToday Monday 10th June,  
    2019");  
    printf("\\n");  
    return 0;  
}
```

- (c) Write the while loop syntax [2 marks].

### Question Three

- (a) Write a program that tells the user to input the radius of a sphere from the keyboard and evaluate the volume (V) using the following formula:

$$V = \frac{4}{3} \pi r^3$$

Note your program must contain appropriate comment for readability and message at the output terminal. [5 marks].

- ii. Explain every statement you have used in (a) above. [5 marks].
- (b) Write a program to evaluate the equation shown here  $3x + 6$  for  $x = 2.55$  [3 marks].
- (c) Write the expected output of the following program [2 marks].

```
#include <stdio.h>  
int main()  
{
```

```

int answer, result;
answer = 100;
result = answer -10; ↵
printf("The result is %i\n", result +5);
return 0;
}

```

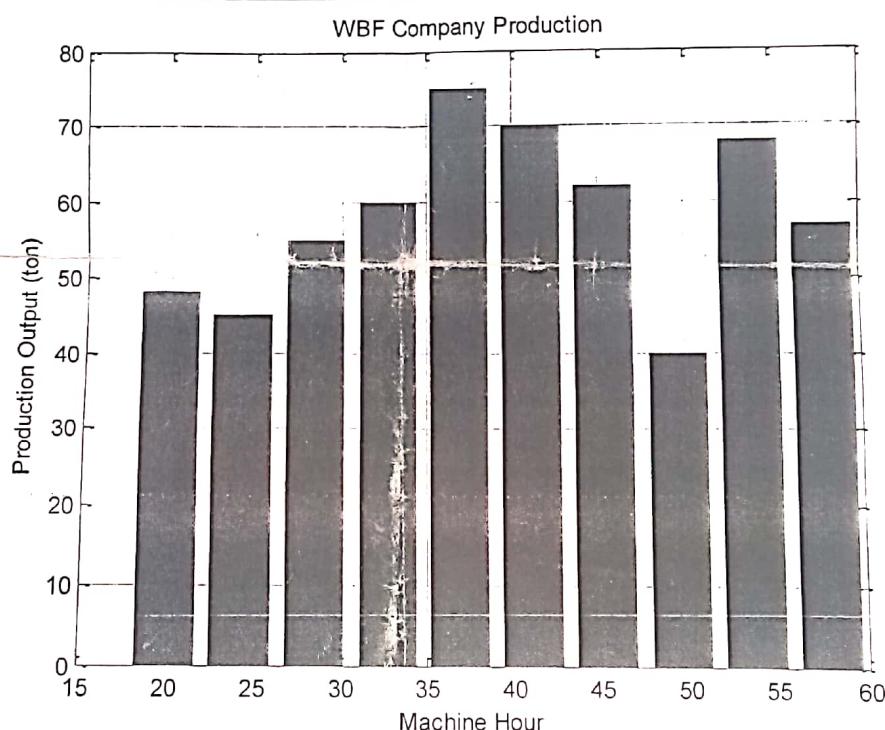
### Section 3

Instruction: Answer only two question from this section

#### Question Four

- (a) The table below presents the production output of WBF Company. Write the MATLAB code to present this information as shown in the figure [10 marks].

Machine Hours	20.00	24.22	28.44	32.67	36.89	41.11	45.33	49.56	53.78	58.00
Production Output (tons)	48	45	55	60	75	70	62	40	68	57



- (b) Write the *code* to *transpose* vectors  $A = [9; 4; 8]$ ; [1 mark].
- (c) Write the *code* to pass in the augmented matrix of the linear system of equation below in MATLAB [4 marks].

$$2x_1 + x_2 - 2x_3 + 2x_4 = 3$$

$$5x_1 - 3x_2 + x_3 - x_4 = 6$$

$$3x_1 + 4x_2 - 3x_3 + x_4 = 6$$

$$3x_1 - x_2 + 2x_3 - x_4 = 3$$

### Question Five

- (a) Using axis square command, write the **code** to plot the function below within time interval of -2 to 2 with an increment of 0.01. [6 marks].

$$f = e^{-t}$$

$$v = \cos(t)$$

ii. The code should include the **grid command** and **legend command** [4 marks].

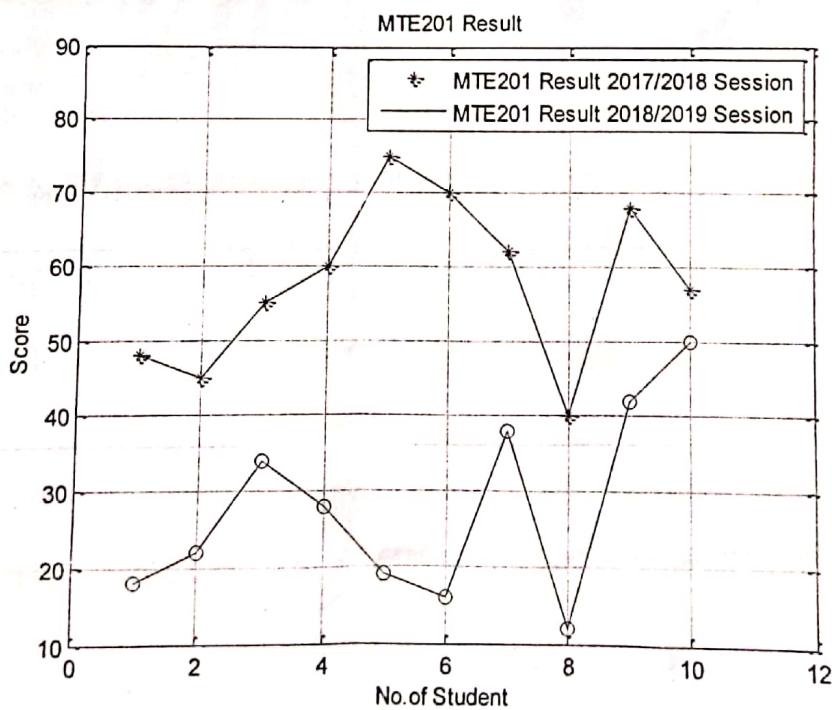
- (b) Given the matrix  $\gg A = [1, 2, 5; 2, 8, 9; 5, 9, 4]$ ; Write the command to obtain the **rank** of matrix A and **delete the third row** of A respectively. [4 marks].

- (c) Consider the row vector  $[8, 3, 9, 10, 5, 4, 12, 20]$ . Write the MATLAB **code** to obtain the minimum element of this row vector and as components of a **rowvector** [1 mark].

### Question Six

- (a) The table below presents the MTE201 result for two successive session. Write the MATLAB code to present this information as shown in the figure [10 marks].

No. of Student	1	2	3	4	5	6	7	8	9	10
MTE201_Result_2017/2018 Session	48	45	55	60	75	70	62	40	68	57
MTE201_Result_2018/2019_Session	18	22	34	28	19	16	38	12	42	50



- (b) Given the base and height of a triangle to be 8 mm and 3 mm respectively, write the MATLAB code to calculate its Area [4 marks].
- (c) Write the MATLAB code to evaluate the square root of 256 and returns the value for H [1 mark].