



Jawaharlal Nehru Engineering College, MGM University.

Semester End Theory Examination- May/June-2022

End Term Exam A.Y. 2021-2022

Program: Mechanical Engineering

Marks : 30

Course Name: Engineering Materials & Metallurgy Semester: IV (Regular)

Course Code: 20UMB4021 Duration: 2 Hours

Instructions to the students:

1. All questions are compulsory.
2. Solve any one part (a or b) of each question.
3. All questions carry equal marks.

Q1. (a) What do you mean by average number of atoms per unit cell? Calculate average number of atoms belonging to Body Centred Cubic Structure [BCC]. 6

OR

Q1. (b) Define Planar or Surface defect. Explain twin boundary defect in detail with neat diagram.

Q2. (a) Draw the Iron-Carbon diagram. Explain significance of Critical temperatures in brief. 6

OR

Q2. (b) Explain the Eutectic transformation in brief with neat diagram. Apply the Lever rule at room temperature to calculate amount of Pearlite and amount of cementite in Transformed Ledeburite.

Q3. (a) Explain the transformation product of Austenite to Martensite in brief with neat diagram. 6

OR

Q3. (b) Draw the TTT diagram and explain the Continuous cooling transformation on it in brief.

Q4. (a) Explain the Conventional Hardening heat treatment in brief with suitable diagram. 6

OR

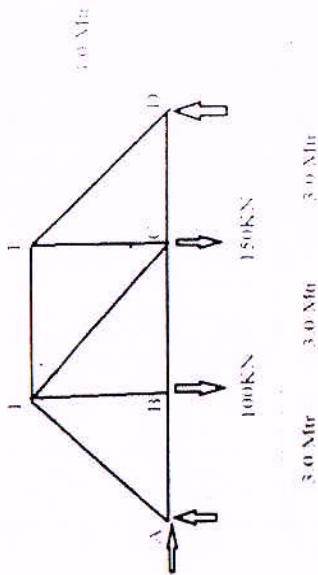
Q4. (b) Describe in brief Time quench or interrupted quench heat treatment with neat diagram.

Q5. (a) Explain in detailed the steps involved in Metallography or specimen preparation. 6

OR

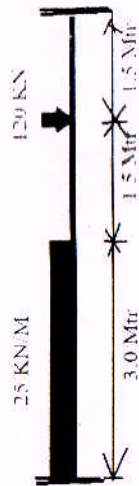
Q5. (b) Explain the functions of different parts of optical microscope in detail with appropriate diagram.

- b) Determine vertical & horizontal deflection of joint C of the truss as shown below the sectional area of each member is 1000 mm^2 . Take $E = 200 \text{ KPa/mm}^2$. (10)

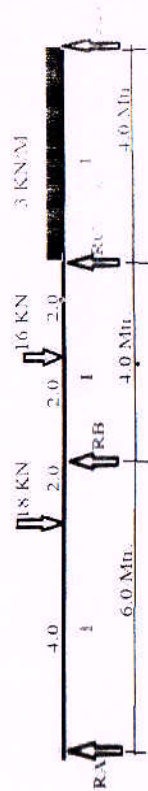


Q3. Solve any one

- a) A fixed beam of span 7.0 mtr carries UDL of 25 kN/m over a distance of 3.0 Mtr and Point load of 120 kN at 4.5 Mt from left support. Find fixed end moments and reactions at support. Draw BM & SF diagrams. (10)



b)

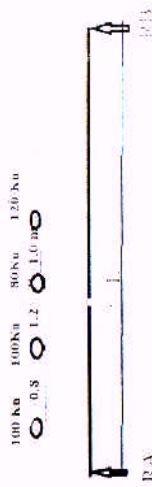


Analyse the continuous beam as shown above by using Theorem of Three Moments and draw Bending moment & Shear force Diagram.

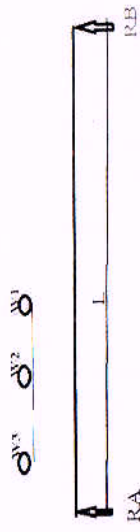
(10)

Q4. Solve any one

- a) The load system shown in fig below moves from left to right on a girder of 10 meters. Find the absolute maximum bending moment for the girder. (10)

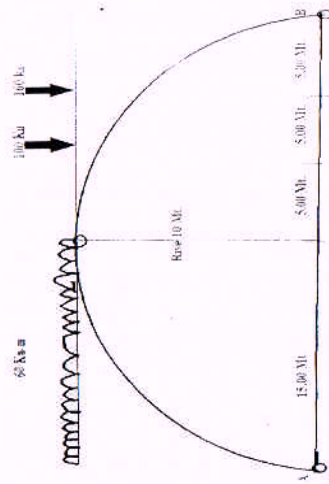


- b) Calculate maximum RA & RB for the rolling load W1= 250 kN, W2= 150 kN, W3= 400 kN, distance between W1 & W2 is 0.8 M, W2 & W3 is 1.0 M. Over the Span of 12 M. (10)



Q5. Solve any one

- a) A three hinged arch has a span of 30 meter and a rise of 10 meter. The arch carries a uniformly distributed load 60 kN per meter on left half of its span, it also carries two concentrated loads of 160 kN and 100 kN at 5 m and 10 m from the right end. Determine the horizontal thrust at each support. (10)





MGM University
Aurangabad-431003
Second Term Exam A.Y. 2021-22

Program: Mechanical Engineering
Course: Mechanism of Machines
Course Code: 20UME403D

Semester-IV
Marks: 60
Duration 4 hrs.

Instructions to the students

1. Each question carries 10 marks.
2. All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc. wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

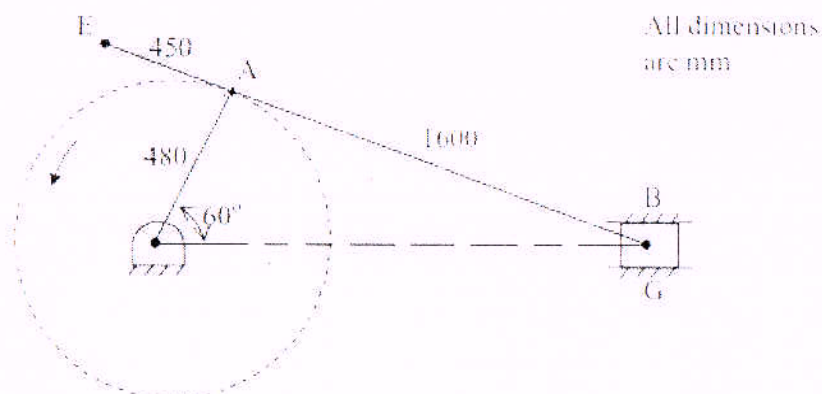
Marks

Q1. Solve any two

- a) Explain with neat sketches two inversions of four bar chain. (5)
- b) State and explain Kutzbach criterion. (5)
- c) Explain any one straight line mechanism (5)

Q2. Solve any two

- a) For the configuration of slider crank mechanism shown in figure below with connecting rod AB as 1600 mm and is extended up to E such that AE is 450 mm.. Calculate i) Acceleration of slider B, ii) Acceleration of point E, iii) Angular acceleration of link AB. Crank OA rotates at 20 rad/sec CCW. (10)





MGM University
Aurangabad-431003
Second Term Exam A.Y. 2021-22

Program: Mechanical Engineering
Course: Product Design - I
Course Code: 20UMI406D

Semester -IV
Marks: 30

Instructions to the students

1. Each question carries 7.5 marks.
2. All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc. wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

	Marks
Q1. Solve any one	
a) Explain steps involved in product design?	(7.5)
b) Explain Reverse Engineering concept with example	(7.5)
Q2. Solve any one	
a) List down all specification of your product idea	(7.5)
b) How we can use market survey to develop new product.	(7.5)
Q3. Solve any one	
a) Write steps followed for your product design.	(7.5)
b) Justify detail specifications of components involved in your Product idea.	(7.5)
Q4. Solve any one	
a) Write down importance of rapid prototyping	(7.5)
b) Write down the application of 3D printing.	(7.5)

End of paper



MGM University
Aurangabad-431003
Second Term Exam A.Y. 2021-22-Part-II

Program: Mechanical Engineering
Course: Advanced Machine Tools
Course Code: 20UME40D

Semester –IV
Marks: 60
Duration: 03 Hours

Instructions to the students

1. Each question carries 10 marks.
2. All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc. wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q1. Solve any two

- a) Define orthogonal and oblique cutting. (Marks)
(5)
- b) What is a chip? Mention its different types. (5)
- c) What is a Tool wear? Enlist its different types? (5)

Q2. Solve any two

- a) Explain Cylindrical Grinding Process. (5)
- b) Explain centreless grinding Process. (5)
- c) Explain Honing Process in detail? (5)

Q3. Solve any two

- a) Enlist the different milling operations and explain any one operation. (5)
- b) Write nomenclature of plain milling cutter. (5)
- c) Differentiate up milling and down milling. (5)

Q4. Solve any two

- a) What are the various operations that can be performed on a lathe? (5)
- b) What are the principal parts of a lathe? (5)
- c) Explain reaming and tapping operation performed on drilling machine. (5)

Q5. Solve any two

- a) Explain water jet machining in detail. (5)
- b) Explain Electro discharge machining in detail. (5)
- c) Explain electron beam machining. (5)

Q6. Solve any two

- a) Enlist different application of additive manufacturing process. (5)
 - b) Explain Binder jetting process of additive manufacturing. (5)
 - c) Enlist characteristics and advantages of additive manufacturing process. (5)
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MGM University
Aurangabad-431003
Second Term Exam A.Y. 2021-22

Program: Mechanical Engineering
Course: Mechatronics
Course Code: 20UME405D

Semester –IV
Marks: 30

Instructions to the students

1. Each question carries 5 Marks
 2. All questions are compulsory
 3. Illustrate your answers with neat sketches, diagram etc. wherever necessary
 4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.
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Q1. A. What is the main reason of using hydraulics system in JCB for lifting heavy loads?

Marks
(1)

- | | |
|---|------------------------------|
| a. Because it is the universal standard | b. Because it is less costly |
| c. Because of force multiplication phenomenon | d. None of the above |

B. Solve any one

- | | |
|---|-----|
| a) What is a Mechatronics System? | (4) |
| b) Differentiate between Electrical System & Mechanical System. | (4) |

Q2. A. Which of the following is Active sensor based technology

(1)

- | | |
|----------|----------|
| a. LIDAR | b. RADAR |
| c. Both | d. None |

B. Solve any one

- | | |
|--|-----|
| a) Explain the static characteristics of sensors. | (4) |
| b) Explain the working principle of capacitive proximity sensor. | (4) |

Q3. A. Output is compared with the input in _____ system

(1)

- | | |
|------------------------|----------------------|
| a. Closed loop control | b. Electronics |
| c. Electrical | d. Open loop control |

B. Solve any one

- | | |
|---|-----|
| a) Differentiate between Tree wiring system & Ring wiring system. | (4) |
| c) Draw standard symbols for DC current, AC current, Electric Motor & Lamp. | (4) |

Q4. A. Identify the symbol given below.

(1)



b. Pressure regulator

b. Service unit

c. Lubricator with filter

d. FRL unit

B. Solve any one

a) Which DCV you will use to stop / lock the double acting cylinder in between its stroke. (4)

Explain with a circuit.

b) Draw & explain electro-pneumatic circuit for the automatic reciprocation of double acting cylinder. (4)

Q5. A. Drones are generally equipped with

(1)

a. BLDC Motors

b. AC Motors

c. Stepper Motors

d. DC Motors

B. Solve any one

a) Explain with an electrical circuit "direct actuation & indirect actuation of solenoid" which one you will chose? Support reasons for your selection of one. (4)

b) Explain the working principle of electromagnetic relay (4)

Q6. A. In context with the PLC, which of the following is an input device?

(1)

a. Motor

b. Light

c. Sensor

d. Buzzer

B. Solve any one

a) How will you make an electrical linear actuator using an electric motor? (4)

b) How will you automate switching on & off for a ceiling fan? (4)

End of paper



MGM University
Aurangabad-431003
First Term Exam A.Y. 2021-22

Program: Mechanical Engineering
Course: Manufacturing Engineering
Course Code: 20UME305D

Sem –III
Marks: 60

Instructions to the students

1. Each question carries 10 marks.
- 2 All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

	Marks
Q1. Solve any two	
a) Explain working principle of sand casting with neat sketch.	(5)
b) How parts are manufactured by shell casting?	(5)
c) Differentiate between permanent pattern and expendable pattern casting. Which are the advantages of evaporative casting?	(5)
Q2. Solve any two	
a) Describe forging operations employed to manufacture the gear blank.	(5)
b) Which forging operation is used to shape the heads of nail and bolt?	(5)
c) How many types of mills can be used for rolling? Explain it with illustrations.	(5)
Q3. Solve any two	
a) Which are the different types of dies used in sheet metal processing?	(5)
b) How aluminium beverage can is manufactured by sheet metal processing?	(5)
c) Explain important characteristics of sheet metal & shearing process.	(5)
Q4. Solve any two	
a) Classify joining processes in details.	(5)
b) Explain different types of flames used in oxy-acetylene welding	(5)
c) Explain plasma welding with neat sketch.	(5)
Q5. Solve any two	
a) Explain extrusion process used to manufacture the polymer tubes.	(5)
b) Describe injection molding process with neat illustration.	(5)
c) Which process will be used to manufacture candy tray, explain it briefly?	(5)
Q6. Solve any two	
a) Describe briefly the production steps involved in powder metallurgy.	(5)
b) Explain why metal powder is blended?	(5)
c) Describe any one method used in compaction of metal powder.	(5)

End of paper

Q.3	B. Attempt any <u>TWO</u> the following questions.	CO	BL	PI	Marks(8)
1	Discuss the operation of biased positive clipper circuit with neat sketch.	CO3	L3	1.2.1	4
2	Discuss the operation of voltage doubler circuit with neat sketch.	CO3	L3	1.2.1	4
3	Discuss bridge wave rectifier operation with C filter. Also sketch input-output waveforms	CO3	L3	1.3.1	4
Q.4	A. Choose the correct option.	CO	BL	PI	Marks(2)
1	The popular biasing method for BJT is..... I. base biasing II. Voltage divider III. Emitter biasing IV. collector biasing	CO4	L1	1.2.1	1
2	The best coupling in cascaded amplifiers is..... I. Transformer coupling II. Capacitor coupling III. Inductor coupling IV. Direct coupling	CO4	L1	1.2.1	1
Q.4	B. Attempt any <u>TWO</u> the following questions.	CO	BL	PI	Marks(8)
1	Discuss the voltage divider biasing methods of BJT.	CO4	L3	1.3.1	4
2	Discuss the operation of RC coupled amplifier with its frequency response.	CO4	L3	1.3.1	4
3	What is thermal runaway in BJT? Discuss the Classification of amplifiers.	CO4	L3	1.2.1	4
Q.5	A. Choose the correct option.	CO	BL	PI	Marks(2)
1is a metal-semiconductor junction diode. I. Schottky diode II. Tunnel diode III. PIN diode IV. Zener diode	CO5	L1	1.2.1	1
2	The CE configuration of BJT is used for..... I. AF application II. RF applications III. Impedance matching IV. LF applications	CO5	L1	1.2.1	1
Q.5	B. Attempt any <u>TWO</u> the following questions.	CO	BL	PI	Marks(8)
1	Discuss the operation of biased positive clamper circuit for AC input.	CO5	L3	1.2.1	4
2	Compare class A, class B, class AB and class C power amplifiers.	CO5	L3	1.2.1	4
3	Discuss the depletion mode of MOSFET.	CO5	L3	1.2.1	4
Q.6	B. Attempt any <u>TWO</u> the following questions.	CO	BL	PI	Marks(10)
1	What is tunneling effect? Discuss its V-I characteristics in detail.	CO6	L3	1.2.1	5
2	What is clamping? Discuss the operation of voltage doubler circuit.	CO6	L3	1.2.1	5
3	What is feedback in amplifiers? Discuss the various feedback configurations of amplifier.	CO6	L3	1.2.1	5



MGM University
Aurangabad-431003
First Term Exam A.Y. 2021-22

Program: B.Tech (Mechanical) Engineering

Course: Engineering Thermodynamics

Course Code: 20UME303D

Duration: Three Hrs.

Sem –III

Marks: 60

Date: 27 / 01 / 2022

Instructions to the students

1. Each question carries 10 marks.
- 2 All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should Mention it clearly
5. Use of Steam Table and Mollier Chart is allowed
6. Use of non-programmable calculator is allowed

Marks

Q1. Solve any two

- a) Explain with suitable example open, closed and isolated systems. (5)
- b) State and explain Clausius Statement. (5)
- c) A closed system under goes a non-cyclic process (change of state). During this process system rejects 50 kJ of heat to surrounding and system does 30 kJ of work. Is internal energy of system increase or decrease and how much? (5)

Q2. Solve any two

- a) Define the terms: wet steam, dry steam, super-heated steam, sub-cooled liquid and saturated liquid. (5)
- b) Draw neat sketch of Throttling calorimeter and explain its working. (5)
- c) Determine by using steam table, specific volume, specific enthalpy, specific entropy and specific internal energy of dry saturated steam at 15 bar pressure. (5)

Q3. Solve any two

- a) Represent Ideal Reheat Rankin cycle in T-s plane and explain different processes involved. (5)
- b) With the help of neat sketch explain effect of Boiler and Condenser pressures on efficiency of Rankin cycle. (5)
- c) A steam power plant operates between boiler pressure of 30 bar, 250°C and condenser pressure of 50 kPa. Determine thermal efficiency of cycle. (5)

Q4. Solve any two

- a) Represent Ideal Diesel cycle in P-v and T-s planes and explain different processes involved. (5)
- b) With the help of neat sketch, compare Otto and Diesel cycles for same compression ratio and same heat input. (5)
- c) In an Otto cycle, air at 1 bar and 300 K is compressed adiabatically until the pressure rises to 9 bar. If 500 kJ/kg of energy in the form of heat is supplied at constant volume, determine thermal efficiency of cycle. (5)

Q5. Solve any two

- a) What are applications of compressed air? (5)

- b) Obtain an expression for work required by reciprocating air compressor without clearance volume. (5)
- c) A single stage, single acting reciprocating air compressor compresses 1 kg of air from 1 bar, 300 K to a delivery pressure of 4 bar. The compression follows the law $PV^{1.33}=C$. If compressor runs at 550 rpm, determine indicated power of the compressor. (Neglect clearance volume) (5)
- Q6. Solve any two
- a) Define calorific value and explain Higher and Lower calorific values of a fuel. (5)
- b) Draw a neat sketch of Boy's Gas Calorimeter and explain its working. (5)
- c) A hydrocarbon fuel contains 80% carbon and 20% hydrogen by mass. If the fuel is burnt with 10 per cent excess air, determine amount of air required to burn one kg of this fuel. (5)

End of Paper