ME-L 130

3E1206

Roll No. _____ [Total No. of Pages : 3]

3E1206

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Agriculture Engineering

3AG2-01 Advance Engineering Mathematics - I

AN,AG,AE,CE,CR,EC,EI,ME,MH,PT

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Show $\Delta^3 y_2 = \nabla^3 y_5$.

2. Show that $\Delta^2 e^x = (e-1)^2 e^x$; interval of differencing being unity.

3. Write the formulae of Trapezoidal rule and simpson 1/3 rule.

4. Using Euler method find the value of y(0.025). Given $\frac{dy}{dx} = x + y + xy; y(0) = 1$ and step size $h = 0.025$.

5. Find the inverse Laplace transform of $\frac{1}{s(s^2+1)}$

6. *If L(F(t)) = f(S)* then find the Laplace Transform of *F'(t)*.

7. Write the formulae of Fourier sine transform and inverse Fourier sine transform.

8. If $F_c[f(x,t)] = \overline{f}(s,t)$ then write $F_c\left[\frac{\partial^2 f(x,t)}{\partial x^2}\right]$

9. State convolution theorem for Z - transform.

10. Find $Z(n)$.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

1. Show $\Delta \tan^{-1}\left(\frac{n-1}{n}\right) = \tan^{-1}\left(\frac{1}{2n^2}\right)$, interval of differencing being unity.

2. The distance covered by an athlete for the 50 meter race is given in the following table.

Time (Seconds)	0	1	2	3	4	5	6
Distance (meters)	0	2.5	8.5	15.5	24.5	36.5	50

Determine the speed of the athlete at t = 5 sec.

3. Find $L(\sin\sqrt{t})$ and hence obtain $L(\cos\sqrt{t}/\sqrt{t})$.

4. Find $\int_0^\infty \left(\frac{e^{-t} - e^{-3t}}{t}\right) dt$

5. Find the Fourier Transform of the following

$$f(x) = \begin{cases} 1-x^2 ; |x| \le 1 \\ 0 \quad ; |x| > 1 \end{cases}$$

6. Solve the following Integral equation

$$\int_0^\infty f(t)\cos\alpha t \, dt = \begin{cases} 1-\alpha & 0 \le \alpha \le 1 \\ 0 & , \alpha > 1 \end{cases},$$

7. Use convolution theorem to show that $Z^{-1}\left\{\frac{z(z+1)}{(z-1)^3}\right\} = n^2$

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. **(3×10=30)**

1. From the following table find $f'(6)$

x	0	2	3	4	7	9
f(x)	4	26	58	112	466	922

2. Use Milne's Method to obtain the solution of the equation $\frac{dy}{dx} = x - y^2$ *at* $x = 0.8$ *and at* $x = 1$ given that $y(0) = 0$.

3. Prove $L\left\{\frac{\text{Sin}^2 t}{t}\right\} = \frac{1}{4}\log\left(\frac{S^2+4}{S^2}\right)$ and hence deduce the integral

$$\int_0^\infty \frac{\sin^2 t}{t^2} dt$$

4. Prove $e^{-x}\cos x = \frac{2}{\pi}\int_0^\infty \frac{(\lambda^2+2)\cos\lambda x}{(\lambda^4+4)} d\lambda$

5. Solve the following difference equation by using Z - transform

$u_{n+2} - u_{n+1} + u_n = n^2 2^n,\ u_0 = u_1 = 0$

3E1200

Roll No. _____ [Total No. of Pages : 4

3E1200

B.Tech. III-Sem. (Main & Back) Examination, January/February- 2024

Agricultural Engineering

3AG 1-03 Managerial Economics and Financial Accounting

All Branches

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory **(10×2=20)**

1. Explain Gross Domestic Product (GDP).
2. Draw circular flow of economic activities
3. Draw graph to show
   a) Perfectly Inelastic Demand
   b) Perfectly elastic demand **(1 + 1=2)**
4. What is Giffen Paradox?
5. Give mathematical form of Cobb - Douglas production function.
6. Define Explicit and implicit costs with example. **(1 +1= 2)**
7. Draw a chart to show different market structures.
8. List four important features of Monopoly market. **(0.5 × 4 = 2)**
9. What is golden rule of accounting for real accounts? **(1 +1 =2)**
10. Define payback period.

PART - B

(Analytical/Problems solving questions)

Attempt any Five questions **(5×4 =20)**

1. Define National Income. Explain steps involved in the estimation of national income by income method. **(1+3=4)**
2. Explain economies and diseconomies of scale with examples. **(2+2=4)**
3. How will you calculate cash flows from operating activities by direct and indirect method. Explain with example. **(2+2=4)**
4. a) Why is the demand curve of a firm under monopolistic competition more elastic than under monopoly? Explain.
   b) Explain 'freedom of entry and exit to firms in industry' feature of monopolistic competition. **(2+2=4)**
5. Explain following with help of suitable graph. **(1×4=4)**
   a) Zero income elasticity
   b) Negative Income elasticity
   c) Unit incom elasticity
   d) Income elasticity greater than unity
6. Give brief answer of following Questions on Balance Sheet: **(1×4=4)**
   a) On balance sheet, accruals, notes payable, and account payable are listed under which category?
   b) Inventories, cash and equivalents, and accounts receivables are listed as?
   c) A firm buys products but does not pay to suppliers instantly. This is recorded as?
   d) In a balance sheet, the total of common stock and retained earnings are denoted as?
7. Explain following ratios: (Formula is must) **(2+2=4)**
   a) Liquidity Ratio
   b) Solvency Ratio

PART - C

(Descriptive/Analytical/Problems Solving/Design question)

Attempt any Three questions **(3×10=30)**

1 a) Complete the following table: (0.25×30 =7.5)

QTY (UNITS)	TFC (Rs.)	TVC (Rs.)	TC (Rs.)	AVC (Rs.)	ATC (Rs.)	MC (Rs.)
0	60	.....	.....	.....	.....	.....
1	.....	30	.....	.....	.....	.....
2	.....	.....	100	.....	.....	.....
3	.....	.....	.....	.....	.....	5
4	.....	.....	.....	.....	28.75	.....
5	.....	.....	.....	15	.....	.....

b) Draw graph/graphs showing relationship between any five Costs with Quantity (Units).

You can show them in single graph or in separate five graphs. **(0.5×5=2.5)**

2. Calculate and also comment on degree of elasticity: **(4×2.5=10)**

a) The price of tea per cup is decreased from Rs. 4 to Rs.3 and the demand of coffee is increased from 2 cups per day to 4 cups per day. Calculate Cross Elasticity of Demand.

b) Mr. Gupta's income is raised from Rs. 10,000 to Rs. 15,000 and the demand for good A is raised from 500 to 800 units. Calculate Income Elasticity of Demand.

c) The demand of commodity X is raised from 200 to 250 units when price decreased from Rs. 8 to Rs. 6. Calculate Price Elasticity of Demand.

d) If the price rises of good A rises from Rs. 20 to Rs. 30. Its supply increases from 200 to 800 units. Calculate Elasticity of Supply.

3. "Economics is an art." Elaborate this statement by explaining meaning, nature and scope of Economics. **(2+4+4=10)**

4. "A competitive firm is not a price maker, but adjustor." Explain this statement with reference to price determination in long and short term under perfect competition. **(4+6=10)**

5. From the following balance sheet of Brown and co. Ltd. as on 31st Dec. 2020 and 31stDec.2021:

Liabilities	2020 (Rs.)	2021 (Rs)	Asset	2020 (Rs.)	2021 (Rs.)
Share capital	5,00,000	7,00,000	Land & Building	80,000	1,20,000
Profit & loss a/c	1,00,000	1,60,000	Plant & Machinery	5,00,000	8,00,000
General Reserve	50,000	70,000	Stock	1,00,000	75,000
Sundry creditors	1,53,000	1,90,000	Sundry Debtors	1,50,000	1,60,000
Bills payable	40,000	50,000	Cash at Bank	20,000	20,000
Expenses O/S	7,000	5,000			
TOTAL	**8,50,000**	**11,75,000**	**TOTAL**	**8,50,000**	**11,75,000**

Additional Information:

a) Rs. 50,000 depreciation has been charged on Plant and Machinery during 2021.

b) A piece of Machinery was sold for Rs. 8,000 during the year 2021. It had cost Rs. 12,000; depreciation of Rs. 7,000 had been provided on it.

Prepare a Schedule of changes in Working Capital and a Statement showing the Sources and Application of Funds for 2021. **(3+3+2+2=10)**

(Show Adjusted Profit & Loss Account and Plant & Machinery Account in working notes.)

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3E1250

Roll No. _____ [Total No. of Pages : 2

3E1250

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Agricultural Engineering

3AG1-02/Technical Communication

All Branches

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

*Attempt all **Ten** questions from Part A, **Five** questions out of **Seven** questions from Part B and **Three** questions out of **Five** questions from Part C.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

*Use of following supporting material is permitted during examination. (Mentioned in form **No. 205**)*

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. What are various aspects of technical communication?
2. Write two importance of technical communication.
3. Define style in technical communication.
4. What are various steps to read a technical text?
5. List the benefits of note - making.
6. Name different technical texts.
7. Correct the following sentences.
   i) Both the sister were seen at the party.
   ii) She is one of the best student in our class.
8. Form two words by using the each prefix - in and - un.

9. Underline and rewrite the noun phrase in the following sentences.

   i) The cat with the stripes tried to trip me.

   ii) My green gym socks are in the hamper.

10. Write a short note on Linguistic Ability.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

1. Explain ERRQ and SQ3R Reading Technique.
2. Reading makes a man complete francis Bacon. How can you develop effective reading skills?
3. What is the process of reading a technical manual?
4. Elaborate various ways to collect information.
5. Enlist various factors which affect designing of a document.
6. What are various types of technical articles? Explain.
7. Enumerate the different characteristics of technical project proposal.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. **(3×10=30)**

1. Explain various types of note-making.
2. Describe various features of style in technical communication.
3. Assume yourself as the cultural secretary, you are organizing an instrument playing programme in your Institute/College/ University. Draft an e-mail informing all the teachers, students and staff members of your College about the event and invite them to attend the event. Invent the necessary details.
4. Assuming yourself a hostler, write minutes of the meeting, which you have attended with the hostel wardern and chief warden to improve the quality of food served in the hostel mess.
5. Prepare a report on the Campus placement Drive organized in your College on 12th Jan. 2023.

3E1102

Total No. of Questions: Total No.of Pages:

Roll No. _____

B.Tech. III-Sem (Back) Exam 2024
HSMCAeronautical Engineering
3AN1-02Technical Communication
3E1102
All branches

Time: 2 Hours **Maximum Marks: 80**
Min. Passing Marks: 28

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No.205)
1._____ 2._____

Part A(Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 what is the meaning of Technical communication?

Q.2Write Down the Various Communication Skills?

Q.3What is the importance of Conference?

Q.4why do we take notes from a long passage? What is its utility?

Q.5Rewrite the name of the following book as you would put it in a bibliographical reference: 1979. 3rd edition. Macmillian. The Elements of Style written by W. Strunk and E. B. White.

5 x 2 = 10

Part BAnalytical/Problem solving questions
Attempt any four questions

Q.1Write an oral presentation for a debate on "Modern Technology is doing more harm than good to man". You are to speak for one minute in favour of the topic.

Q.2How is technical paper written?

Q.3What do you understand by the term technical communication? How is it different from general purpose communication?

Q.4.What is group discussion? Discuss the importance of group discussion and how it is helpful in interviews?

Q.5should email replace the communication forms such as memos and letters? Explain your answer?

Q.6What is Report? Discuss various sections of a formal report in detail.

4 x 10 =40

Part C(Descriptive/Analytical/Problem Solving/Design Question)
Attempt any two questions

Q. 1As the purchase officer of a company, write a complaint letter to comfort Home Appliances, New Delhi, pointing out the damage which was discovered after checking the consignment containing Refrigerators sent to you by supplier

Q.2Write the difference between the following terms with suitable examples:-
(a) Memos and reports.
(b) Press release and newsletters
(c) Dissertation and thesis
(d) References and bibliography

Q.3Write an essay on one of the following:-
a) India in 20-20
b) Role of youth society.

2 x 15 =30

3E1103

Total No. of Questions: Total No.of Pages:

Roll No. _____

B.Tech.III Sem (Back) Exam 2024
HSMCAeronautical Engineering
3AN1-03Managerial Economics & Financial Accounting
3E1103
All branches

Time: 2 Hours **Maximum Marks: 80**
Min. Passing Marks: 28

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No.205)
1_____ 2. _____

Part A(Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 Define Managerial Economics?

Q.2 What is Normative Theory of Economics?

Q.3What are the features of Oligopoly?

Q.4 Define Time Value of Money?

Q.5 Mention the concept of Demand?
5 x 2 = 10

Part BAnalytical/Problem solving questions
Attempt any four questions

Q.1Describe fully the concept of price elasticity of demand?

Q.2State the relationship of managerial economics with Other Subjects?

Q.3 What is Perfect Competition State its features?

Q.4.Explain the Different Features of Business Cycle?

Q.5 Explain Capital Budgeting?

Q.6Calculate the BEP in units and rupees using the following details: • Selling price per unit Rs. 100 • Variable costperunitRs.60•FixedcostsRs.20,000•ActualsalesRs.2,00,000

4 x 10 =40

Part C(Descriptive/Analytical/Problem Solving/Design Question)
Attempt any two questions

Q. 1 Explain the concept of Managerial Economics? List out the applications and importance of Managerial Economics?

Q.2How is price and output determination under monopoly different from that under perfect competition?

Q.3. A Company prepares a budget to produce 3, 00,000 Units, with fixed costs as Rs. 15, 00,000 and average variable cost of Rs.10 per unit. The selling price is to Yield 20%profit on Cost. You are required to calculate
(a) BEP in Rupees
(b) P/V Ratio
(c) Margin of Safety

2 x 15 =30

3E1207

Roll No. _____ [Total No. of Pages : 3

3E1207

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Automobile Engineering

3AE3-04 Engineering Mechanics

AE, ME

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/Calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

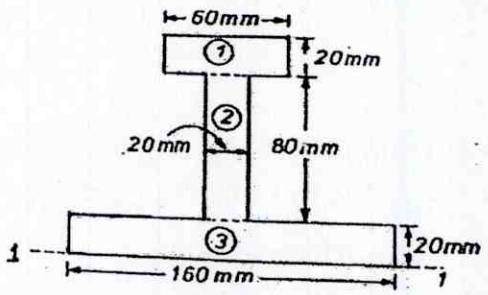
1. State the principle of transmissibility of forces.
2. State the Varignon's principle of moments.
3. Explain the conditions of equilibrium.
4. What are the assumptions made, while finding out the forces in the various members of a framed structure?
5. Distinguish between center of gravity and centroid.
6. Explain reversibility of a machine.
7. Explain the angle of friction.
8. Distinguish between the motion and velocity.
9. State the D'Alembert's principle of motion.
10. State the law of conservation of energy.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

1. State and prove the Lami's theorem.
2. Explain the assumptions used in the analysis of frames.
3. A beam AB of span 10 m carries two point loads of 20 kN and 3OkN at 4 m and 6 m from the end A, respectively. Calculate the reactions of the beam by the principle of virtual work.
4. Calculate the distance of centroid from 1-1 line of lamina as shown in figure.



5. In a lifting machine, an effort of 15 N raised a load of 750 N. Calculate the mechanical advantage. Also calculate the velocity ratio if the efficiency at this load is 50%.
6. Calculate the power transmitted by a belt running over a pulley of 800 mm diameter at 300 rpm. The coefficient of friction between the pulley and belt is 0.20, angle of lap 180° and maximum tension in the belt is 2 kN.
7. A flywheel of mass 8 tonnes starts from rest, and gets up a speed of 180 r.p.m. in 3 minutes. Calculate the average torque exerted on it, if the radius of gyration of the flywheel is 60 cm.

PART - C

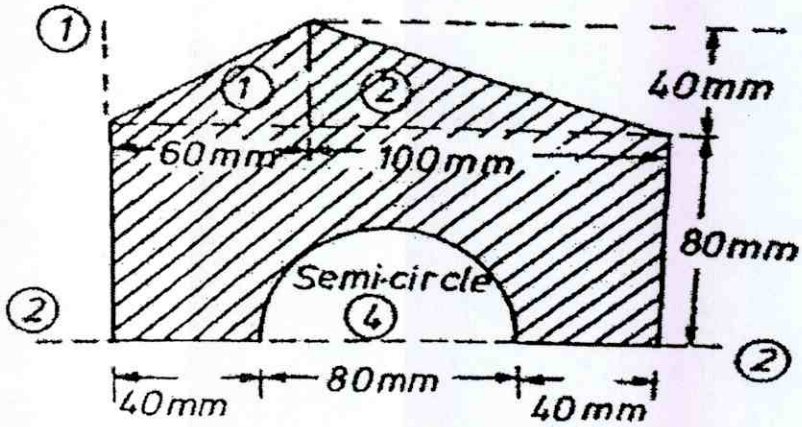
(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions **(3×10=30)**

1. ABCD is a square. Forces of 10, 8 and 4 units act at A in the directions AD, AC and AB respectively. Using the analytical method, determine: **(5+5=10)**
   i) Resultant force in magnitude and direction
   ii) Magnitude and sense of two forces along the directions AJ and AH, where J and H are the mid-points of CD and BC respectively, which together will balance the above resultant.

2. Derive an expression for length of an open belt for the power transmission.

3. Calculate the moment of inertia of the shaded portion as shown in figure about its centroidal axes.



4. A uniform ladder of weight 200 N and length 5m is placed against a vertical wall in a position where its inclination to the vertical is 30^0. A man weighing 650 N climbs the ladder. At what position will he induce slipping? The coefficient of friction for both the contact surfaces of the ladder is 0.3.

5. A hammer of mass 1200 kg drops from a height of 0.80m on a pile of 600 kg. Find

   a) The common velocity pile and pile hammer after impact,

   b) The average resistance of the ground if the pile comes to rest after penetrating 60 mm into the ground.

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3E1116

Total No. of Questions:

Total No.of Pages:

Roll No. _____

B.Tech.III Sem (Back) Exam 2024
ESCAutomobile Engineering
3AE3-04Engineering Mechanics
3E1116
AE,ME

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1_____ 2. _____

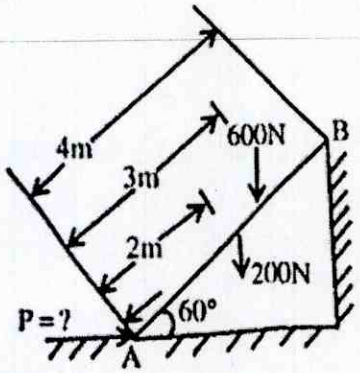
Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 Explain free boy diagram.
Q.2What do you mean by moment of inertia?
Q.3Explain the principle of virtual work.
Q.4Define the terms centroid and centre of gravity.
Q.5Briefly state effect of slip on belt drive

5 x 2 = 10

Part B (Analytical/Problem solving questions)
Attempt any four questions

Q.1Derive an expression for the length of the cross belt system.
Q.2Classify the trusses and discuss different types of loading.
Q.3Explain lifting machine and discuss any one system of pulley.
Q.4 A ladder of length 4 m weighing 200 N is placed against a vertical wall as shown below. The coefficient of friction between the wall and the ladder is 0.2 and that between the floor and ladder is 0.3.The ladder in addition to its own weight, has to support a man weighing 600 N at a distance of 3 m from A .Calculate the minimum horizontal force to be applied at A to prevent slipping.



Q.5Explain D'Alembert principle.

Q.6Explain principle of work and energy, Conservative and Non-conservative Force.

4 x 10 =40

Part C (Descriptive/Analytical/Problem Solving/Design Question)
Attempt any two questions

Q. 1A 400N ball is dropped from a height of 3 m upon a 15° incline. If e = 0.6, find The resultant velocity of the ball after impact.

Q.2Write short notes on:-

(a) Radius of gyration.
(b)Angle of repose.
(c) Oblique impact.
(d) Polar moment of inertia

Q.3A 1500 N block is in contact with a level plane, the coefficient of friction between two contact surfaces being 0.1, if the block is acted upon by a horizontal force of 300 N, what time will elapse before the block reaches a velocity of 16 m/s starting from the rest? If 300 N forces is then removed, how much longer will the block continue to move? Solve the problem using impulse momentum method.

2 x 15 =3

3E1208

Roll No. _____ [Total No. of Pages : 2]

3E1208

B.Tech. III-Sem. (Main & Back) Examination, January./February - 2024

Automobile Engineering.

3AE4-05 Engineering Thermodynamics

AE,ME

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory (10×2=20)

1. What is the first law of thermodynamics, and how does it relate to the conservation of energy principle?
2. Define entropy and explain its role in the second law of thermodynamics.
3. Write the Gay-Lussac law?
4. Define control Volume?
5. What is the Carnot cycle, and why is it considered an ideal heat engine cycle?
6. Describe the difference between isothermal and adiabatic processes in a thermodynamic system.
7. How does the Rankine cycle relate to the operation of steam power plants, and what are its key components?
8. Define the term "enthalpy" and discuss its importance in analyzing heat transfer processes.
9. What is the concept of irreversibility in thermodynamics, and why is it essential to consider in real-world engineering applications?
10. What is the relation between C_p and C_v?

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. (5×4=20)

1. Explain the first law of thermodynamics. Calculate work done in Isothermal process.
2. Write down the general energy equation for steady flow system and simplify when applied for steam turbine and gas turbine.
3. Explain the Clausius and Kelvin Planck statements to Second law of thermodynamic.
4. What is the non-steady flow process? Derive an expression for
   i) Filling a vessel,
   ii) Emptying a vessel
5. Explain the Carnot cycle and Carnot engine with suitable diagrams.
6. Differentiate among heat engine, refrigerator and heat pump.
7. Write down and explain the Corollary of Carnot theorem.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions. (3×10=30)

1. Explain term "Entropy". Derive the expression for entropy change for a closed system in terms of temperature and volume.
2. Explain concept of availability. Derive an expression for Availability in steady flow system.
3. Explain and differentiate between availability function and Gibb's energy function?
4. Explain the followings related to steam formation:
   i) Internal latent heat
   ii) Entropy of evaporation
   iii) External work of evaporation
5. Explain regenerative and bleeding extraction cycle in steam power generation.

3E1117

Total No. of Questions: Total No.of Pages:

Roll No. _____

B.Tech.III Sem (Back) Exam 2024
Automobile Engineering
3AE4-05 Engineering Thermodynamics
3E1117
AE,ME

Time: 3 Hours **Maximum Marks: 120**
Min. Passing Marks: 42

Attempt all ten questions from Part A, five question out of seven from Part B and four questions out of five from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1._____ 2._____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 What is meant by thermodynamic system? How do you classify it?
Q.2 What is meant by closed system? Give an example
Q.3 What is meant by reversible and irreversible process.
Q.4 Write Zeroth Law of thermodynamics.
Q.5 Define the term enthalpy?
Q.6 Define an isentropic process.
Q.7 Define entropy of a pure substance
Q.8 What is meant by thermodynamic work?
Q.9 Which cycle is more efficient for the same compression ratio and heat input, Otto cycle or Diesel cycle?
Q.10 What do you understand by equilibrium of a system?

10 x 2 = 20

Part B(Analytical/Problem solving questions)
Attempt any Five questions

Q.1 Explain and derive Isothermal process.
Q.2 Explain Carnot engine cycle and its efficiency.
Q.3 Explain Dalton's law of partial pressures.
Q.4.Explain regenerative cycle.
Q.5 Derive Joule-Thomson coefficient equation.
Q.6 2 kg of steam initially at 5 bar and 0.6 dry is heated at constant pressure until the temperature becomes 350^0 c.find the change in entropy and internal energy.
Q.7 Explain Gibbs Dalton law.

5 x 8 =40

Part C(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any four questions

Q. 1 Air flows through an adiabatic compressor at 3 kg/s the inlet conditions are 2 bar and 310k and exit conditions are 20 bar and 560 k. compute the net rate of availability transfer and irreversibility.
Q.2 A certain quantity of gas is head at constant pressure from 35°c to 185°c. Estimate the amount of hem transferred, ideal work done, change in internal energy, when the initial volume of the gas is 0.6 m^3.
Q.3 Derive the expression for thermal efficiency of a Carnot cycle with its p-V and Ts Diagram?
Q.4 Explain feed water heating co-generation cycle with the help of neat sketch.
Q.5 A Carnot engine takes heat from an infinite reservoir at 550^0C and rejects it to a sink 275^0C. Half of the work delivered by the engine is used to run generator and the other half is used to run heat pump which takes heat at 275^0C and rejects it at 440^0C. Express the heat rejected at 440^0C by the heat pump as % of heat supplied to the engine at 550^0C. If the operation of the generator is 500W, Find the heat rejected/hour by the heat pump at 440^0C? 4 x 15 = 60

3E1209

Roll No. _____ [Total No. of Pages : 2]

3E1209

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Automobile Engg.

3AE4-06 Materials Science and Engineering

AE,ME

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory **(10×2=20)**

1. Define space lattice. What are its important characteristics?
2. What is hardness?
3. What is elastomer? How do they differ from plastics?
4. Discuss the general effects of tempering the steel.
5. Explain space lattice and unit cell with diagram.
6. Explain Baushinger's effect with diagram.
7. Explain benefits of Imperfection.
8. Explain strain hardening phenomenon.
9. Explain synthesis process of PMMA and PEEK polymers.
10. Define atomic packing Factor.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

1. Define Material Science of Engineering. Give classification of Engineering Materials.
2. Define imperfection in crystalline solids. Explain point imperfection in detail with suitable diagrams.
3. Define Recovery, Recrystallization and Grain Growth. Explain their effect on Grain size, Internal Stress and Mechanical Properties with the help of Suitable Diagram.
4. What is meant by the term hardenability? Describe how hardenability of steel can be estimated?
5. Explain the solid to solid phase transformation system with neat sketch.
6. Explain the Bureau of Indian Standards (BIS) standards for steels.
7. Describe Gibb's phase rule. How this rule is applied to pure metals and binary alloys?

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions. **(3×10=30)**

1. Explain the effect of alloying element with their percentage on properties of steel.
2. Explain TTT diagram in detail with suitable diagram. Explain various phase transformation heat treatment process in it.
3. Explain the system in which two metals are completely soluble in liquid state and as well as solid state. Draw its diagram
4. Define resilience property. Explain the both Methods in detail to determine it with suitable diagrams.
5. Calculate the APF for SC, BCC, and FCC Crystal Structure with neat Diagrams.

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3E1118

Total No. of Questions:

Total No. of Pages:

Roll No. _____

B.Tech.III Sem (Back) Exam 2024
Automobile Engineering
3AE4-06 Materials Science and Engineering
3E1118
AE,ME

Time: 3 Hours

Maximum Marks: 120
Min. Passing Marks: 42

Attempt all ten questions from Part A, five question out of seven from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1_____ 2. _____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q.1 Explain the term crystal imperfections.
Q.2 Elobrate the cold/hot working recovery.
Q.3 Elobrate the binary isomorphous alloy system.
Q.4 Write the applications of PE, PP and PS.
Q.5 State the potential application of nanomaterials.
Q.6 Explain the frank reed source of dislocation.
Q.7 Explain the term case hardening.
Q.8 Explain the term bauschinger's effect.
Q.9 Elaborate the term peritectic transformation.
Q.10 Elaborate the term Flame and Induction hardening.

10 x 2 = 20

Part B(Analytical/Problem solving questions)
Attempt any Five questions

Q.1 Write a notes on elastic & plastic modes of deformation.
Q.2 Explain the term polymers and its types.
Q.3 Explain the term normalizing, hardening and tempering for steel.
Q.4 Write the properties of engineering ceramics and its applications.
Q.5 Elaborate the mechanism of crystallization (i) nuclear formation and (ii) crystal growth.
Q.6 Explain in brief creep test and what is its importance?
Q.7 Differentiate between Rockwell, Brinell and Vickers hardness testing.

5 x 8 =40

Part C(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any four questions

Q.1 Explain the characteristics of BCC and FCC structures with a neat diagram.
Q.2 Draw and explain TTT diagram from eutectoid steel. Explain important transformation taking place in it on cooling.
Q.3 Draw neat iron carbon equilibrium diagram with explanation of each phase, compositions and temperature.
Q.4 Explain the term nano materials. Explain nano clusters & nano crystals.
Q.5 Explain the term full annealing, stress relief, and spheroidizing.

4 x 15 = 60

3E1210

Roll No. _____ [Total No. of Pages : 4

3E1210

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024
Automobile Engineering
3AE4-07 Mechanics of Solids
AE,ME

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

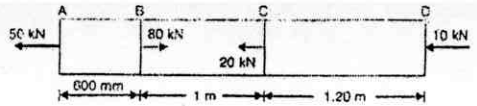
1. Draw stress-strain diagram for a ductile material.
2. Define the Yield point.
3. Explain the factor of safety.
4. Explain modulus of rigidity.
5. What is the Proof Resilience?
6. Write down the maximum strain energy theory.
7. Write down the expression for equivalent twisting moment for shaft subjected to torsion and bending forces?
8. Draw a bending moment diagram of simply supported beam of L span subjected to W kg load at mid of span.
9. What is the relationship among twisting moment, shear stress and torsional rigidity? Write the formulae and notations.
10. Write down the general formula for strain energy due to torsion load.

PART - B

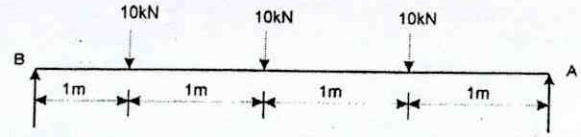
(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

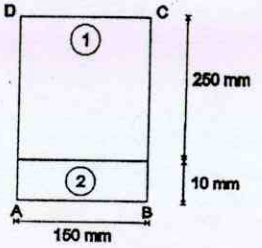
1. A brass bar of area 1000 mm² is subjected to axial load as shown in figure. Determine the total elongation of bar. Take E = 1.05 × 10^5 N/mm².



2. How can systematically construct a Mohr circle to analyze direct stresses in a material or structural element, and what are the fundamental steps involved in this process?
3. Consider a cantilever beam of length L = 5 meters subjected to a point load of 10 kN applied at a distance of 2 meters from the free end. Calculate and draw the bending moment and shear force diagrams for the entire length of the beam.
4. Draw the shear force diagram and Bending moment diagram for following simply supported beam with point loads.



5. Cross section of a composite beam is given in following figure: E1=10GPa and E2=200GPa.



Determine the distance of neutral axis from side AB?

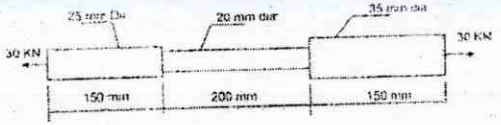
6. What are the primary stresses that thin-walled pressure vessels are subjected to when exposed to internal or external pressure, and how do these stresses vary across the vessel's cross-section? Explain the key equations used to calculate these stresses?
7. A solid cylindrical shaft with a length (L) of 2 meters and a diameter (D) of 100 mm is subjected to a torque (T) of 500 Nm. Calculate the maximum shear stress and the angle of twist (in radians) along the length of the shaft. Assume the shaft is made of a material with a shear modulus (G) of 80 GPa.

PART - C

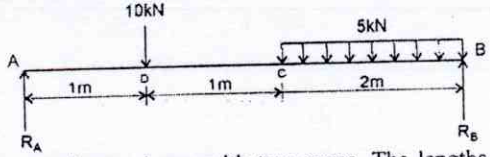
(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. **(3×10=30)**

1. A steel bar shown in figure is subjected to a tensile load of 30 KN. Determine elongation of the bar if E=200kN/mm². Also find maximum stress induced.



2. A simply supported beam AB of 4 metre span is loaded as shown in the following figure. Determine
   i) deflection at point c,
   ii) Maximum deflection and
   iii) Slope at the end A Take E=2×10⁵ N/mm² and I=1000 cm⁴.



3. Consider a continuous beam with two spans. The lengths of the spans are as follows:
   Span AB: 4 meters and Span BC: 6 meters
   The beam is subjected to point loads and UDLs as follows:
   i. At point A (left support), there is a point load of 10 kN downward.
   ii. At point B (mid-span of AB), there is a UDL (Uniformly Distributed Load) of 4 kN/m that covers the entire span AB.
   iii. At point C (right support), there is a point load of 8 kN downward.
   Calculate and draw the bending moment diagram for the entire length of the continuous beam.

4. A hollow steel shaft 8m long is to transmit 250 kW power at 250 R.P.M. The total angle of twist in this length is not to exceed 2.5 degree and the allowable shear stress is 80 N/mm². Determine the inside and outside diameters if N 0.082 ×10⁶ N/mm².

5. What are the fundamental principles and factors that govern the theory of elastic failure in materials and structures, and how do these principles relate to the concepts of stress, strain, and material properties when analyzing the elastic limits of a material?

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3E1119

Roll No. _____ |Total No. of Pages : 3

3E1119

B.Tech. III-Sem. (Back) Examination, January/February - 2024

PCC Automobile Engineering

3AE4-07 Mechanics of Solids

AE, ME

Time : 3 Hours **Maximum Marks : 160**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Four questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

ALL questions are Compulsory. **(10×3=30)**

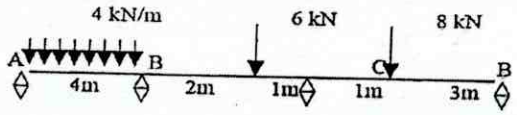
1. Define longitudinal strain and lateral strain.
2. List any four types of beams.
3. Define shear stress.
4. What is indeterminate beam?
5. What is meant by point of contra flexure?
6. What is slenderness ratio of a column?
7. What is buckling load?
8. What are the limitations of Euler's theory of columns?
9. State principal strain theory.
10. What is shear centre?

PART - B

(Analytical/Problem solving questions)

Attempt any FIVE questions. **(5×10=50)**

1. Derive the relation for minimum deflection of a simply supported beam with uniformity distributed load over entire span. Use strain energy method.
2. Derive a relation for strain energy due to torsion.
3. A simply supported beam of span 8 m carries a udl of 4 kN/m over the entire span and two point loads of 2 kN at 2 m from each support. Find the mid span deflection using strain energy method. E = 200kN/mm2, I = 16 x 108 mm4.
4. Derive the expression for strain energy due to bending.
5. Using the theorem of three moments draw the shear force and bending moment diagrams for the following continuous beam.



6. Derive an expression for crippling load when one end of the column is fixed and the other end is free.
7. Using Euler's theory, find the buckling load for the column with following Boundary conditions: i) Fixed-free ii) Fixed-hinged.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Four questions. **(4×20=80)**

1. At a point in a strained material a direct tensile stress of 70 N/mm² and a direct compressive stress of 50 N/mm² are acting on planes at right angles to each other. If the maximum principal stress is limited to 75 N/mm² tensile, determine the shear stress that may be allowed on these planes. Also determine the

   i) Minimum principal stress
   ii) Maximum shear stress and
   iii) Direction of principal planes.

2. Find the Euler's critical load for a cast iron hollow column of external diameter 200 mm diameter, 25 mm thick and of length 6 m hinged at both ends. E=0.8×104N/mm². Compare Euler's load with Rankine's critical load. Assume fc=550 N/mm² and $\alpha = 1/1600$. Find the length of column at which both critical loads are equal.

3. A column with one end hinged and the other end fixed has a length of 5 m and a hollow cylinder cross section of outer diameter 100 mm and wall thickness 10 mm If E=1.60×10⁵N/mm² and crushing strength $\sigma_c = 350 N/mm^2$ find the load that the column may carry with a factor of Safety of 2.5 according to Euler theory and Rankine-Gordon theory. If the Column is hinged cn both ends, find the safe load according to the two Theories.

4. An I section of a beam consists of top flange 140 mm×40 mm and bottom flange 140 mm ×40 mm. The web is 20 mm× 220mm. The centre line of the web is 80 mm from the left edge of the flanges and 60 mm from the right edges of the flanges. Determine the position of shear centre for the beam.

5. A beam of length 6m is simply supported at its ends and carries a point load of 48 kN and 40kN at a distance of 1m and 3m respectively from the left suport.

   Find

   a) Deflection under each load

   b) Maximum deflection

   c) Point at which maximum deflection occurs by double integration method

   Given

   E=2×105N/mm2 and I = 85×106mm4.