3RD SEM./ AERO./AME / AUTO. /MECH./ DME/ MECH(Main.)/ MECH(PROD.)/ MECH(SAND)/ MECH(IND.INT.)/ 2023(W) NEW

Th-1 Production Technology

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. What is blanking operation?
   b. Explain Sintering process.
   c. State the use of cores in a casting.
   d. Jigs & Fixtures increases the production cycle time (Yes/No). Justify your answer.
   e. Name any two materials suitable for Arc- Welding Process.
   f. What is the use of dies in press work?
   g. Classify Extrusion process.
   h. What is economics of casting?
   i. What are the objectives of studying Production Technology?
   j. Define Rolling Process.

2. Answer **Any Six** Questions 6 x 5
   a. Differentiate between Jigs and Fixtures.
   b. What is Extrusion Process? Discuss briefly about any one type of extrusion process.
   c. Compare hot rolling and cold rolling process.
   d. Discuss the significance of oxidizing and reducing zones of a cupola furnace.
   e. What is punching operation? Discuss about various types of punches.
   f. Discuss about Resistance Spot Welding process with sketch.
   g State the limitations of powder metallurgy process.

3 What are the various types of Press Working Operations? Explain in details. 10

4 Write short notes on 10
   a) Indirect Extrusion
   b) Compound Dies
   c) Cold Shut
   d) Blending

5 Explain TIG process with a neat sketch. 10

6 Discuss about any five types of casting defects, its causes and remedies. 10

7 Explain 3-2-1 point location of a rectangular jig in details. 10

3RD SEM ./AERO/AIRCRAFT MAINT./ AUTO/ DME/ MECH(MAIN) /MECH(PROD)/MECH(SAND) /MECH/ MECH(IND.INT.)/ 2023(W)NEW

Th -2 Strength of Material

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

   a. Define stress and strain.

   b. State and explain Hooke's law.

   c. Define principle of superposition.

   d. Define and explain column.

   e. Write and explain torsion.

   f. What is section modulus? Write down the expression for section modulus of rectangular section.

   g. Explain shear force and bending moment.

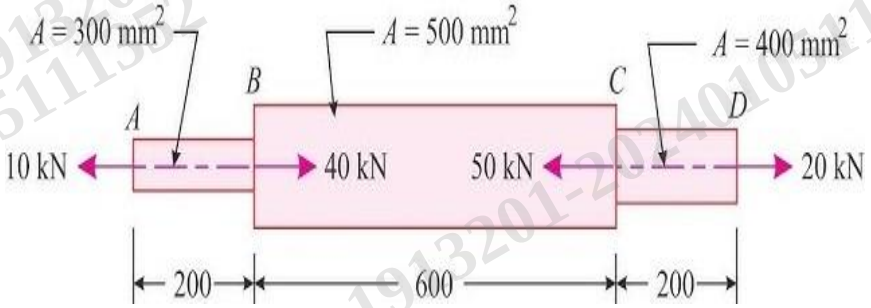
   h. Write down the significance of Mohr's circle.

   i. What is slenderness ratio?

   j. Define point of contra-flexure.

2. Answer **Any Six** Questions 6 x 5

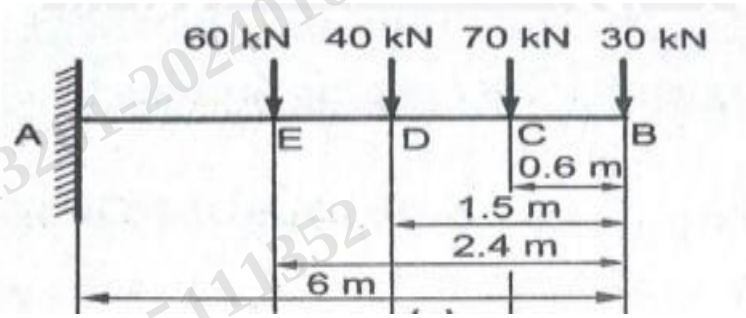
   a. Determine the total elongation in the bar as shown in figure. (Take E= 210 GPa, length in mm)



   b. A cylindrical shell of 2m long and 1m internal diameter is made up of 20mm thick plates. Find the circumferential and longitudinal stresses in the shell material, if it is subjected to an internal pressure of 5 MPa.

c. At a point in a strained material, the principal stresses are 100MPa and 50MPa both tensile. Find the normal and tangential stress at a section inclined at 60° with the axis of major principal stress.

d. Draw SFD and BMD of the beam as shown in figure.



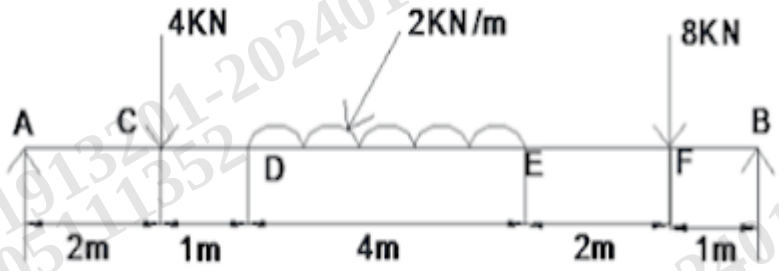
e. State and explain the assumptions taken while deriving the bending equation under theory of simple bending.

f. Define buckling load. State and explain the formula for buckling load in column with various end conditions.

g Derive the expression for hoop stress and longitudinal stress for thin cylindrical shell.

3 Define Young's modulus, modulus of rigidity and Poisson's ratio. Derive the relation between them. 10

4 Draw Shear Force and Bending Moment diagram for the given simply supported beam. 10



5 Illustrate with neat sketches about the different types of loads and beams. 10

6 Derive the torsion equation for solid circular shaft. 10

7 Define power transmission by a shaft. Derive an expression for strength of a solid shaft. 10

3RD SEM./ MECH/AUTO/AERO/ AIRCRAFT MAINT./ DIP. IN MECH./ MECH. (MAINT.)/ MECH.(PROD.)/ MECH (IND INTG.)/MECH(SWITCH.)/2023(W) NEW

TH-3 ENGINEERING MATERIAL

Full Marks: 80 **Time- 3 Hrs**

Answer any Five Questions including Q No.1& 2
Figures in the Right hand margin indicates Marks

1. Answer **All** questions 2 x 10

   a. Define porosity.

   b. State two applications of nonferrous material.

   c. What is phase diagram? State its significance.

   d. What is crystal defect? State different types of crystal defect.

   e. What is hardenability?

   f. What is babbit material? State its applications.

   g. Define polymerization.

   h. Give two examples of ceramics and state its applications.

   i. What is fibre reinforced composites?

   j. Define annealing.

2. Answer **Any Six** Questions. 6 x 5

   a. Explain the effects of various alloying elements such as Cr, Mn, Ni & V.

   b. Explain various types of point defect with neat sketch.

   c. What is the purpose of heat treatment? Explain normalizing heat treatment process.

   d. Classify composite material. Discuss dispersion strength composites.

   e. Differentiate between thermosetting and thermoplastic polymers.

   f. Explain deformation by slip and twinning.

   g Discuss different functions of bearing.

Answer any Three Questions.

3 Explain different mechanical properties of engineering material. 10

4 Draw iron carbon diagram and explain its salient points. 10

5 Discuss various properties of plastic. 10

6 Explain carburizing and nitriding. 10

7 What is reliability? Explain performance requirements of engineering material. 10

1913201-20240108114121

3RD SEM./ AERO/AIR.MAINT./AUTO./DIP.IN MECH./MECH(MAIN)/ MECH(PROD.)/MECH(SAND.)/MECH./MECH(IND.INT.)/2023(W) NEW

Th-4 Thermal Engineering-1

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. Define intensive and extensive properties with example.
   b. What is meant by stroke length in an IC engine?
   c. State the zeroth law of thermodynamics.
   d. In which process work done is equal to heat transfer and how.
   e. Define fuel and types of fuel.
   f. State kelvin plank statement of 2^{nd} law of thermodynamics.
   g. Draw P-V and T-S diagram of diesel cycle.
   h. Define octane number.
   i. State charle's law.
   j. What is c.o.p of refrigerator?

2. **Answer Any Six Questions** 6 x 5
   a. Differentiate between CI and SI engine.
   b. Derive the relationship between C_p , C_v and R.
   c. What is thermodynamics system? Explain briefly different types of thermodynamics system.
   d. The thermal efficiency of a carnot heat engine is 60.5%. The minimum temperature of the cycle is 25^{0c}. find the maximum temperature of the cycle.
   e. State and explain first law of thermodynamics.
   f. Derive $P_1V_1/T_1 = P_2V_2/T_2$
   g The initial pressure and temperature of certain quantity of air contained in a closed vessel are 15 bar and 30^{0c} respectively. Air is heated until its temperature rises to 100^{0c}. Determine the final pressure.

Answer Any Three Questions

3 Explain the otto cycle with the help of P-V and T-S diagram and derive an expression for the ideal efficiency of the cycle. 10

4 What is an isothermal process? Derive an expression for the work done during isothermal process? 10

5 $0.15m^3$ of air at a pressure of 1.06bar is compressed to a volume of $0.008m^3$ at 36 bar. If compression follows the law $PV^{1.3}$= constant and Y for air is 1.41 find 10
(i) quantity of heat added or rejected and
(ii) change of internal energy

6 An engine working on otto cycle stroke volume $9424800mm^3$. clearance volume is $1500000mm^3$. Determine the air standard efficiency of the engine. Take Y=1.4 10

7 Explain the working of four stroke petrol engine with neat sketch. 10

3RD SEM./ COMMON TO ALL /2023(W) NEW

Th-5 Environmental Studies

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. Write down two effects of deforestation.
   b. Differentiate between renewable and non-renewable energy sources.
   c. Write down two effects of modern agriculture methods on environment.
   d. Define decomposers in eco system.
   e. What are the types of biodiversity?
   f. Define ozone layer depletion.
   g. Write down two causes of air pollution in urban areas.
   h. What is endangered species?
   i. Explain 3'R's in waste management.
   j. What are the various objectives of family welfare programme?

2. Answer **Any Six** Questions 6 x 5
   a. Discuss how urbanisation affects environment.
   b. Give a brief description of man wild life conflict.
   c. What are the methods protecting soil from erosion.
   d. Define rainwater harvesting? State main objective of rain water harvesting?
   e. Discuss how marine pollution affects aquatic animals.
   f. Write down the role of an individual protecting environment.
   g Write about the disaster management procedures during cyclone.

Answer Any Three Questions

3 Define dam. Discuss the environmental and social impacts during construction of dam. 10

4 Define bio diversity and explain about bio geographical classifications in India. 10

5 Describe pond eco-system. 10

6 Write down the cause, effect and control of water pollution. 10

7 Write short notes on 10
   a. Value of education
   b. Solid waste management