Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME2101

II B.Tech I Semester Supplementary Examinations, May-2018.

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(ME)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. a) State and explain Kirchhoff's Voltage Law.
   b) List the applications of DC generators?
   c) Why rating of the transformer is given in KVA?
   d) What are the limitations of Synchronous impedance method?
   e) What are the advantages with feedback amplifier?
   f) Explain the properties of an OP – AMP

   [2+2+2+2+2+2]

PART-B

2. a) Explain the star-delta and delta-star transformation for a resistive network? [6M]
   b) Two resistances when they are in series have an equivalent resistance of 9 ohms and when connected in parallel have an equivalent resistance of 2 ohms. Find the two resistances? [6M]
3. a) Derive the EMF equation of a DC Generator. [6M]
   b) An 8-pole generator has 500 armature conductors and has a useful flux per pole of 0.065Wb. What will be the EMF generated if it is lap connected and runs at 1000RPM? What must be the speed at which it is to be driven to produce the same EMF if it is wave wound? [6M]
4. a) What is the working principle of a single phase transformer? Explain with the help of neat diagram. [6M]
   b)A 3300/250V, 50Hz single phase transformer is built on a core having an effective cross sectional area of 125cm^2 and 70 turns on the low voltage winding. Calculate (i) the value of the maximum flux density and (ii) the number of turns on the high voltage winding. [6M]
5. a) Describe the Torque- Slip characteristics of 3-phase induction motor. [6M]
   b) Explain the procedure to determine the regulation of three phase alternator by using synchronous impedance method? [6M]
6. a) With a neat sketch explain operation of a PN junction diode? Draw its V-I characteristics [6M]
   b) Draw and explain the input and output characteristics for transistor CE configuration? [6M]
7. a) Discuss about the characteristics of an OP-AMP [6M]
   b) Describe the inverting Op-Amplifier with circuit diagram and derive necessary expressions. [6M]

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Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME2102

II B.Tech I Semester Supplementary Examinations, May-2018.

MECHANICS OF SOLIDS

(ME)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Define strain energy. How is it stored in a body?
   (b) What is meant by point of contraflexure? Explain with the help of an example.
   (c) Sketch the shear stress distribution across T- section.
   (d) The deflection at the end of a cantilever carrying a u.d.l. w per unit length over " the whole span is given by_____".
   (e) Show the variation of stresses in thick and thin cylinders across the thickness
   (f) What is polar modulus? Give its value for a solid circular shaft of diameter *d*.

[2+2+2+2+2+2]

PART-B

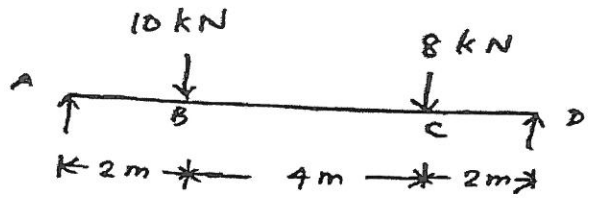
4 X 12 = 48

2. Three bars made of copper; zinc and aluminum are of equal length and have cross section 500, 750 and 1000 square mm respectively. They are rigidly connected at their ends. If this compound member is subjected to a longitudinal pull of 250 k N, estimate the proportional of the load carried on each rod and the induced stresses. Take the value of E for copper 1.3 x 10^5 N/mm^2, for Zinc 1.0x 10^5 N/mm^2 and for aluminum 0.8 x 10^5 N/mm^2.

3. (a) Draw SF and BM diagrams for a over hanging beam carrying a UDL of 3 kN/m over the entire length of 8m. The distance between the supports is 5 m and has one side over hanging length of 3 meters
   (b) Derive the relationship between rate of loading, shear force and bending moment starting from fundamentals.

4. (a) Explain about bending stress, neutral axis and section modulus of a beam.
   (b) An 'I' beam has flanges 100 mm wide and 10mm thick and web 120mm high and 10 mm thick. If this section is subjected to a bending moment of 10 k N-m and a shearing force of 10 kN. Find the maximum tensile shear stresses in it and show the shear stress distribution along the depth of beam section for every 10 mm depth.

5. Determine the slope at the supports and maximum deflection for the beam shown in Figure Use Macaulays method. E=2x10^5N/mm^2 and I=20 x 10^6mm^4.



6. (a) Derive the expressions for hoop stress and radial pressure at any radius x for a thick cylinder and sketch distribution of the same.

b) A thick cylindrical pipe of outside diameter 300mm and thickness of metal 50mm is subjected to an internal fluid pressure of 40 N/mm^2 and an external pressure of 2.5 N/mm^2. Calculate the maximum and minimum intensities of circumferential and radial stresses in the pipe section.

7. (a) A steel shaft ABCD having a total length of 1200 mm is made up of three lengths AB, BC and CD each 400 mm long. AB and BC are solid having diameters of 45 mm and 55 mm respectively and CD is hollow, having outside and inside diameters of 55 mm and 35 mm respectively. When an axial torque of 1600 Nm is transmitted from one end of the shaft to the other, the total angle of twist from A to D is 2 degrees. Determine
   a) The modulus of rigidity of the material.
   b) The maximum shearing stress in the shaft and state where this occurs.
   c) The angle of twist for each of the three lengths AB, BC and CD

(b) A short column of external diameter 120mm and internal diameter 80mm carries an eccentric load. Find the greatest eccentricity which the load can have without producing tension on the cross-section of the column

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME2103

II B.Tech I Semester Supplementary Examinations, May-2018.

MATERIAL SCIENCE AND METALLURGY

(ME)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What is atomic packing factor and coordination number of **Fe**?
   (b) What is the crystal structure of Martensite and Austenite?
   (c) What are the alloying elements added to Austenitic stabilizer and Ferritic stablizer?
   (d) What is Troosite and Sorbite ?
   (e) What is Cupronickel and Catridge brass?
   (f) What is the role of matrix in a glass fiber reinforced composites?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) The height of the unit cell of Zn, having HCP structure is given = 0.494nm. The distance of the nearest neighbor is 0.27nm. The atomic weight of Zn=65.37. Determine the volume of unit cell & density of Zn **[6M]**

   (b) The atomic radii of Al & Si are 0.143 nm and 0.117 nm respectively.Do they satisfy Hume-Rothery's Rule for complete solid solubility? **[6M]**

3. Construct a phase diagram for the system A-B from the following data:
   Melting point of A &B are 100°C & 800°C respectively. Eutectic point= 500° C at 40 atomic %
   Maximum solubility of A in B at 500°C =10 atomic %
   Maximum solubility of B in A at 500°C = 20 atomic %
   Limits of solid solution at 300°C =10 atomic & in A 5 atomic % in B.
   Label the phase diagram. Calculate fractions of proeutectic phase and eutectic mixture at the eutectic temperature for the alloy containing 25 atomic % B **[12M]**

4. (a) Explain in detail about Killed steel, semi killed steel and Rimmed steel **[6M]**
   (b) Draw the microstructures of Nodular and malleable cast irons and Explain about their formation, properties and uses? **[6M]**

5. (a) Explain with neat sketch of Jominy End Quench test ? **[6M]**
   (b) What is the difference between Austempering and Martempering **[6M]**

6. (a) Explain the properties, alloys and applications of Al alloy ? **[6M]**
   (b) Discuss about alpha-beta and beta Titanium alloys? **[6M]**

7. (a).Explain atomization process for preparation of powders with neat sketch? **[6M]**
   (b).What are metal matrix composites? What are the special characteristics of these composites? What are the reinforcing materials? What are the applications of MMC? **[6M]**

Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME2104

II B.Tech I Semester Supplementary Examinations, May-2018.

FLUID MECHANICS

(ME)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Define compressibility. How it is related to bulk modulus of elasticity.
   (b) Define and distinguish between uniform flow and non–uniform flow
   (c) Define control volume and control surface.
   (d) Define fundamental quantities and repeating variables.
   (e) What are major and minor losses in pipes
   (f) Define displacement thickness and momentum thickness.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain how the surface tension accounts for (i) formation of droplet (ii) rise of liquid in capillary.
   (b) A cylindrical tank is 5m diameter and 10m height is completely filled with water. Find (a) the intensity of pressure and total force on the bottom of the tank (b) minimum, maximum an average pressure intensities on the vertical surface (c) the total force on the vertical surface.
3. (a) Define stream line and path line.
   (b) Water flows through a pipe AB 1.2m diameter at 3m/s and then passes through a pipe BC 1.5m diameter. At C, the pipe branches. Branch CD is 0.8m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and diameter of CE
4. (a) Derive Euler's equation of motion along a streamline.
   (b) A 30cm diameter pipe carries water under a head of 20 meters with a velocity of 3.5 m/s. If the axis of the pipe turns through 45^0, find the magnitude and direction of the resultant force on the bend.
5. (a) Explain the principle of dimensional homogeneity.
   (b) The resistance R experienced by a partially submerged body depends upon the velocity V, length of the body l, viscosity of the fluid μ, density of the fluid ρ and gravitational acceleration g. Obtain a dimensionless expression for R.

6. (a) Derive Darcy-Weisbach equation for loss of head in a pipe due to friction.
   (b) A horizontal pipe, 10cm in diameter, is joined by sudden enlargement to a 15cm diameter pipe. Water is flowing through it at the rate of 2 m^3/min. Find the loss of head due to abrupt expansion and the pressure difference in two pipes. If the change of section is gradual without any loss, what would be change in pressure.
7. (a) Derive the Von-Karman momentum integral equation for boundary layer on a flat plate.
   (b) Explain the concept of drag and lift on an airfoil

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Subject Code: R16ME2105

II B.Tech I Semester Supplementary Examinations, May-2018.

THERMODYNAMICS

(ME)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Define control volume and control surface.
(b) Define enthalpy and internal energy.
(c) What is heat pump how does it differ from a refrigerator.
(d) Define specific heat ? Why gases have two specific heats ?
(e) Define the terms available energy and unavailable energy.
(f) Define compression ratio.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Define and explain the Zeroth law of thermodynamics.
(b) A gas undergoes a reversible non-flow process according to the relation p = (-3V+ 15) where V is the volume in m^3 and p is the pressure in bar. Determine the work done when the volume changes from 3 to 6 m^3.

3. (a) Write the steady flow energy equation for nozzle and diffuser.
(b) It is desired to compress 10 kg of gas from 1.5 m^3 to 0.3 m^3 at a constant pressure of 15 bar. During this compression process, the temperature rises from 20^{0}C to 150^{0}C and the increase in internal energy is 3250 kJ. Calculate the work done, heat interaction and change in enthalpy during the process. Also workout the average value of specific heat at constant pressure.

4. (a) State the Kelvin-Planck and Clausius statements of second law of thermodynamics.
(b) Find the entropy change of 5 kg of a perfect gas whose temperature varies from 150^{0}C to 200^{0}C during a constant volume process. The specific heat varies linearly with absolute temperature and is presented by the relation: c_p = (0.45+0.009 T) kJ/kg K.

5. (a) Explain briefly about pure substance
(b) What is Tripple point ? Discuss briefly about vapour-liqiud-solid phase equilibrium in a pure substance

6. (a) State and explain the Dalton's law of partial pressures.

(b) A mixture 1 mole of carbon dioxide and 3 moles of air is contained in a vessel. If the pressure and temperature are 1 bar and 25^{0}C respectively, make calculations for the following parameters in relation to the mixture:

i. The total mass

ii. The percentage carbon content,

iii. The apparent molecular weight and the gas constant, and

iv. The specific volume.

It may be presumed that volumetric analysis of air by volume is 79% nitrogen and 21% by oxygen.

7. (a) Derive an expression for air standard efficiency of Otto cycle.

(b) In a diesel cycle, air at 0.1 MPa and 300 K is compressed adiabatically until the pressure rises to 5 MPa. If 700 kJ/kg of energy in the form of heat is supplied at constant pressure, determine the compression ratio, cut off ratio, thermal efficiency and mean effective pressure.

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