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END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] DECEMBER 2015-JANUARY 2016

Paper Code: ETME-207 ***Subject: Material Science and Metallurgy***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions including Q.no.1 which is compulsory. Internal choice is indicated.

Q1 (a) Classify steels based on the percentage of carbon, and also give their applications. How does steel become stainless steel? **(5)**

(b) Differentiate between slip and twinning in materials. **(5)**

(c) Distinguish between substitutional and interstitial solid solutions. **(5)**

(d) Write a note on strain hardening. **(5)**

(e) Explain induction hardening with diagram. **(5)**

Q2 Calculate the atomic packing factor of an FCC crystal lattice. Iron has an atomic radius of 0.124 nm, BCC crystal structure and an atomic weight of 55.85 g/mol. Calculate its density. **(12.5)**

OR

Q3 List the diffusion mechanisms in solids and explain with sketches any two of them. **(12.5)**

Q4 (a) What is fatigue? Draw the SN curves for (i) a material that displays a fatigue limit (ii) a material that does not display a fatigue limit. **(8)**

(b) Explain creep curve. **(4.5)**

OR

Q5 Draw a neat sketch of iron-carbon equilibrium diagram and show all the phase fields, temperature, composition on it. Explain the solidification mode of a hyper eutectoid steel of 3% C as it cools from liquid phase. **(12.5)**

Q6 (a) Define hardenability of a material and list the factors affecting hardenability in steels. **(5.5)**

(b) Differentiate between normalizing and annealing with sketches. **(7)**

OR

Q7 (a) Discuss the precipitation hardening of Al-4% wt Cu alloy. **(8)**

(b) Explain case carburization. **(4.5)**

Q8 Explain the general methods of protection from corrosion. **(12.5)**

OR

Q9 (a) Explain Cathodic protection with figures. **(8)**

(b) Write short note on Fiber Reinforced composites. **(4.5)**

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(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2015

Paper Code: ETME-209 **Subject: Electrical Machine**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q no.1 which is compulsory. Select one question from each unit.

Q1 Write short notes on the following:-
(a) Stepper Motor (5)
(b) Torque slip characteristics of induction motor (5)
(c) Torque Equation for DC motor (5)
(d) Back EMF (5)
(e) Voltage regulation of Alternator (5)

UNIT-I

Q2 How the voltage is build-up in DC shunt generator? Sketch the magnetization characteristics of a DC shunt generator and explain critical resistance and critical speed from the same. (12.5)

Q3 (a) Explains Swinburne's test method of determination of efficiency of DC machine? What are the limitations? (6)
(b) A 230V DC shunt motor runs at 1000 rpm and takes 5A. Armature resistance of the motor is 0.025 ohms and shunt fields resistance is 230 ohms. Calculate the drop is speed when the motor is loaded and takes the line current of 41A. Neglect armature reaction. (6.5)

UNIT-II

Q4 Draw and explain phasor diagrams of three phase induction motor and from these drive the equivalent circuit model of induction motor. (12.5)

Q5 (a) Explain how the parameters of a three phase induction motor can be obtained from test results. (6.5)
(b) Describe following:- (6)
(i) Star delta starter for three phase cage induction motor.
(ii) Pole changing method of speed control of three phase induction motor.

UNIT-III

Q6 (a) Draw and explain the phasor diagram of a loaded synchronous generator under lagging, leading and unity power factor conditions. (6.5)
(b) Sketch and explain open circuit and short circuit characteristics of a synchronous motor. (6)

Q7 (a) Why does a synchronous motor not have a starting torque? Explain briefly. Describe with the help of neat diagram the method of starting a synchronous motor. (6.5)
(b) What do you understand by a synchronous condenser? Explain with the help of phasor diagram its operation and application. (6)

UNIT-IV

Q8 Explain with the neat diagrams the following type of single phase induction motors and also draw torque speed characteristics: (6.5)
(a) Split-phase induction motor (6)
(b) Capacitor-start induction motor

Q9 Write short notes on the following:-
(a) Hysteresis motor (4)
(b) Servo motor (4)
(c) AC series motor (4.5)

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER-JANUARY 2015-2016

Paper Code: ETME-203 **Subject: Thermal Science**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each Unit. Use of Scientific calculator, approved thermodynamic tables, Mollier diagram is allowed. Assume suitable data if any.

Q1 Short questions: **(5x5=25)**

(a) Discuss the importance of concept of Continuum in engineering thermodynamics.

(b) Explain significance of Carnot cycle.

(c) Examine efficiencies of Otto, Diesel and Dual cycle on various parameters.

(d) Explain mean temperature of heat addition in Rankine cycle.

(e) Illustrate the formation of P-v Diagram of pure substance other than water.

Unit-I

Q2 Briefly explain the following: **(2.5x5=12.5)**

(a) Quasi-static process

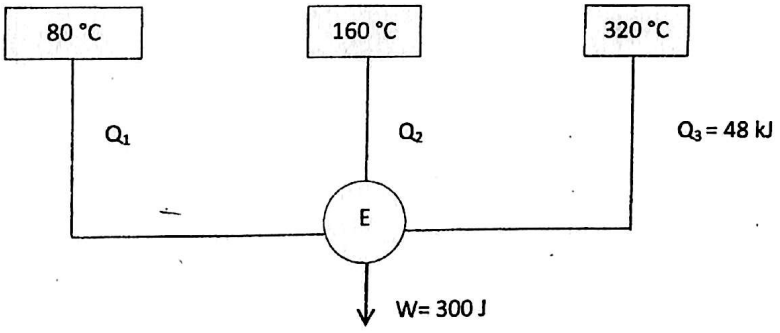
(b) Property

(c) State

(d) Process

(e) Point and Path function

Q3 A reversible engine as shown in figure 1, during a cycle of operation draws 48 kJ from 320 ^{0}C reservoir and does 300 J of work. Find the amount and direction of heat interaction with other reservoirs. **(12.5)**



Unit-II

Q4 An ideal gas expands through the turbine from 500 kPa, 520 ^{0}C to 100 kPa, 300 ^{0}C. During expansion 10 kJ/kg of heat is lost to the surroundings which is at 98 kPa, 20 ^{0}C. Neglecting the kinetic energy and potential energy changes, determine per kg of air:

(a) The decrease in availability **(6.5)**

(b) The maximum work **(3)**

(c) The irreversibility **(3)**

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ETME-203

P1/2

Q5 (a) Is it possible to measure the quality of very wet steam with the help of throttling calorimeter? Justify your answer. **(4)**

(b) A rigid closed tank of volume 3 m^3 contains 5 kg of wet steam at a pressure of 200 kPa. The tank is heated until the steam becomes dry saturated. Determine the final pressure and the heat transfer to the tank. **(8.5)**

Unit-III

Q6 In a reheat cycle, the initial steam pressure and the maximum temperature are 150 bar and 550 ^{0}C respectively. If the condenser pressure is 0.1 bar and the moisture at the condenser inlet is 5%, assuming ideal processes, determine.

(a) The reheat pressure **(4.5)**

(b) The cycle efficiency **(3.5)**

(c) The steam rate **(4.5)**

Q7 (a) Show that the heat transfer though a finite temperature difference is irreversible. **(3)**

(b) A heat engine operating between two reservoirs at 1000 K and 300 K is used to derive a heat pump which extracts heat from the reservoir at 300 K at a rate twice that at which the engine rejects heat to it. If the efficiency of the engine is 40% of the maximum possible and the COP of the heat pump is 50% of the maximum possible, what is the temperature of the reservoir to which the heat pump rejects heat? **(9.5)**

Unit-IV

Q8 (a) State the four processes of Diesel cycle and workout its efficiency. **(4)**

(b) In an air standard Diesel cycle, the compression ratio is 16, and at the beginning of isentropic compression, the temperature is 15 ^{0}C and the pressure is 0.1 MPa. Heat is added until the temperature at the end of constant pressure process is 1480 ^{0}C. Calculate the cut off ratio, the heat supplied per kg of air and the cycle efficiency. **(8.5)**

Q9 (a) Explain Stirling and Ericsson cycle with suitable applications, merits and demerits. **(6)**

(b) A gas turbine plant operates on the Brayton cycle between 300 K and 1073 K. Find maximum work done per kg of air and the corresponding cycle efficiency. How does this efficiency compare with the Carnot cycle efficiency operating between the same two temperature. **(6.5)**

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ETME-203

P2/2

(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2015-JANUARY-2016

Paper Code: ETME-211 **Subject: Strength of Materials-I**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory. Internal choice is indicated. Assume suitable data if found to missing any.

Q1 (a) Define and explain stress at a point. **(2.5x10=25)**

(b) Explain the Complementary shear stress.

(c) What is Thermal stress? Derive the expression for Thermal stress.

(d) Explain Neutral axis. Also draw the bending stress variation for circular cross section beam under uniformly distributed load over whole length.

(e) Derive the relation E = 3K (1-2ν) where E is the young's Modulus of Elasticity, K = Bulk Modulus of elasticity and ν is the Poisson's ratio.

(f) Explain Moment Area Method for finding deflection with suitable example.

(g) Write short notes on Middle Quarter rule.

(h) Derive the expression of strain energy in a circular shaft.

(i) Explain the industrial application of leaf spring.

(j) Explain theory of failure based on Maximum distortion energy.

Q2 A flat bar of Aluminum of cross-section 25 mm x 5 mm is placed in between two steel bars each of cross-section 25 mm x 10 mm so as to form a composite bar of 25 mm x 25 mm cross-section. Three bars are rigidly connected at the ends when temperature is at the ends is 150° C. Determine the stresses developed in each box where temperature is allowed to increase to 600°C. If at 600°C a tensile load of 25 kN is applied to the composite bar, determine the final stresses in each bar. Take E_s = 200 GPa, E_a = 70 GPa, $\alpha_s = 12 \times 10^{-6}/^0C$, $\alpha_a = 12 \times 10^{-6}/^0C$. **(12.5)**

OR

Q3 Find the expression of extension in a uniform prismatic bar due to its own weight. Also find the extension in uniformly tapered circular bar from one end dia. D_1 to other end dia. D_2 under axial tensile load P. Take length of bar is L, young's modulus of elasticity is E. **(12.5)**

Q4 Explain the principle of Superposition. A beam ABCD is 10 m long and supported at B, 1 m from end A and at C, 'x' meter from D. The beam carries a point load of 10 kN at end A and a uniformly distributed load of 4 kN/m run throughout its length. Determine the value of x if the centre of the beam becomes the point of contra flexure. Draw the shear force and bending moment diagrams. **(12.5)**

OR

Q5 A beam 5 m long having a T section with flange of 10 cm x 2 cm and web thickness 2 cm and depth 12 cm is simply supported with flange at the top, at the left hand end and at a point 1.25 m from the right hand end. It carries a total uniformly distributed load of 50 kN over its whole length. Find the maximum tensile and compressive stresses in the beam. **(12.5)**

Q6 What are the assumptions made during derivation of torsion for a circular shaft. A hollow cast iron whose outside diameter is 300 mm and has a thickness of 10 mm is 5 m long and is fixed at both ends. Calculate the safe load by Rankine formulae using a factor of safety of 3. Find the ratio of Euler's to Rankine's load. Take E = 2 x 10^5 MPa and Rankines constant = 1/1600 for both ends pinned case and fc = 600 MPa. **(12.5)**

OR

Q7 In an elastic material, at a certain point on planes at right angles to one another, direct stresses of 300 MPa (T) and 150 MPa (C) are acting. The major principal stress in the material is to be limited to 200 MPa. To what shearing stress the material may be subjected on the given planes? Also find the minimum principal stress and the maximum shearing stress at the point? **(12.5)**

Q8 Derive an expression for the deflection and stiffness of closed-coiled helical spring under axial loading.

A safety valve blows off at 2N/mm^2. Its diameter is 60 mm, it is held by closed coiled helical spring. The mean diameter is 150 mm and initially it is compressed to 18 mm. Determine the wire diameter of the spring and number of turns if maximum allowable shear stress is 60 N/mm^2. Take G = 800 GPa. **(12.5)**

OR

Q9 Derive an expression for circumferential and longitudinal stress developed in a thin cylindrical vessel subjected to internal pressure p.

A compound cylinder is made by shrinking one cylinder over another such that the outer diameter is 200 mm, the inner diameter is 100 mm and the junction diameter is 150 mm. If the junction pressure developed between two cylinders is 10 MPa and the internal pressure is 50 MPa, what are the circumferential stresses at inner and outer radius of both the cylinders? **(12.5)**

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ETME-211

P2/2

(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER-2014

Paper Code: ETME-203 **Subject: Thermal Science**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each Unit. Use of scientific calculator is allowed. Assume suitable data if any.

Q1 Short Questions:- **(5x5=25)**

(a) Discuss concept of flow work.
(b) Explain Thermodynamic systems.
(c) Explain Availability and Irreversibility.
(d) Discuss Entropy Generation.
(e) Explain Regenerative cycles.

Unit-I

Q2 It is proposed to hest 0.002 m^3 of water initially at 20° C to its boiling point of 100°C. 0.5 KW electric heater is supplied for this purpose. Assuming that the system does not exchange a heat with the surrounding, find the time required to achieve the desired object. Take specific heat of water = 4.187 KJ/Kg K. **(12.5)**

Q3 10 kg of air at 280° C is mixed with 5 kg of air at 40°C. The pressure of original parcels and that of mixture is same. Compute the mixture temperature and the entropy increase in Kcal/°K. Take 40°C as the reference temperature and assume specific heat of air 0.24. **(12.5)**

Unit-II

Q4 The compression ignition engine working on an air standard diesel cycle has the following particulars:-
Cylinder bore = 15 cm
Stroke = 25 cm
Clearance volume = 400 cm^3
The fuel injection takes place at constant pressure for 5% of the stroke. Find the air standard efficiency. What will be the percentage loss in efficiency if fuel cut off is delayed from 5 to 8 % of the stroke? It may be assumed that compression ratio remain the same. **(12.5)**

Q5 In a gas engine working on otto cycle the compression is 10 and the suction condition are 1 bar and 50°C. If heat rejection equals 840 KJ/kg, estimate the air standard efficiency and work ratio. How these quantities would compare with those of a Diesel Cycle working under similar condition. **(12.5)**

Unit-III

Q6 Show the efficiency of a diesel engine is less than that of a constant volume cycle for the same compression ratio. Also show that the efficiency decreases as the amount of heat supplied is increased. **(12.5)**

Q7 It is required to generate 1 kg of steam at 10 kgf/cm^2 absolute from the water at 20° C. What would be the quantity of heat required in Kcal/Kg when generated steam is to be (a) wet with dryness fraction 0.9 (b) superheated to temperature of 200 C. Take mean specific heat of superheated steam = 0.55. **(12.5)**

Unit-IV

Q8 (a) Derive the expression for the efficiency and specific work output for a simple gas turbine in terms of pressure ratio. **(6.5)**
(b) Why the performance of a real gas turbine cycle differs from that of an ideal cycle. **(6)**

Q9 (a) Explain Stirling cycle, and Ericsson cycle with suitable applications, merits and demerits. **(6.5)**
(b) Explain the Effect of various parameters on the efficiency of Rankine cycle with suitable applications. **(6)**

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2014-JANUARY 2015

Paper Code: ETEE-211 **Subject: Electrical Mechanics-I**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each Unit.

Q1 Short Questions:- **(5x5=25)**

(a) Discuss magnetic field.
(b) Discuss Torque.
(c) Explain Phasor diagram.
(d) Discuss Sumpner's test.
(e) Discuss Armature Reaction.

Unit-I

Q2 (a) Explain the Singly and doubly excited system with suitable examples. **(6.5)**
(b) Discuss the lap & wave connection with suitable example and applications. **(6)**

Q3 Explain the construction and working of shunt, series and compound connected D.C. generator with suitable diagram along with applications. **(12.5)**

Unit-II

Q4 (a) Explain the Characteristics and applications of separately excited generators with suitable applications. **(6.5)**
(b) Explain Demagnetizing and Cross-magnetizing armature MMF with merits and demerits. **(6)**

Q5 Explain characteristics of D.C. series, shunt and compound motors and their applications along with suitable merits, demerits. **(12.5)**

Unit-III

Q6 (a) Explain the Interpoles and compensating windings with suitable diagram and applications. **(6.5)**
(b) Discuss the Speed and Torque Equation of D.C. motors with sketch. **(6)**

Q7 (a) Discuss the construction and working of 3 phase transformer with suitable example and neat diagrams. **(6.5)**
(b) Discuss in detail the procedure adopted for testing of D.C. Machines with applications. **(6)**

Unit-IV

Q8 (a) Discuss the open circuit test and short circuit test of single phase Transformer with suitable examples and applications. **(6.5)**
(b) Explain the construction and working of Auto-transformer with neat diagram and applications. **(6)**

Q9 (a) Explain with suitable example the Parallel operations of 1-phase and 3-phase transformer along with merits, demerits and applications. **(6.5)**
(b) Discuss the concept of tertiary winding with suitable examples and diagrams. **(6)**

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2014-JANUARY 2015

Paper Code: ETME-205 **Subject: Production Technology (Batch 2013)**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each Unit.

Q1 Short Questions:- **(5x5=25)**

(a) Discuss moulding.
(b) Discuss the function of sprue and runner.
(c) Explain the principle of slag welding.
(d) Discuss drop forging.
(e) Define the use of chaplet and chills.

Unit-I

Q2 (a) Explain the functions and operations of core making machines with suitable examples. **(6.5)**

(b) Explain the construction and working of shell moulding with suitable diagram and applications. **(6)**

Q3 (a) Explain types of gating systems with neat and clean diagram along with merits and demerits. **(6.5)**

(b) Explain the difference between the Crucible furnaces and Cupola furnace with examples. **(6)**

Unit-II

Q4 (a) Explain with diagram the construction and working of the Explosive Welding with applications. **(6.5)**

(b) Explain with diagram the construction and working of the Friction Welding with merits and demerits. **(6)**

Q5 (a) Discuss the difference between Hot working and cold working with suitable applications. **(6.5)**

(b) Explain the Constructional features of Tube drawing with neat diagram and applications. **(6)**

Unit-III

Q6 (a) Explain the Process of Deep drawing and its analysis with suitable diagram and applications. **(6.5)**

(b) Explain the types of rolling mills and their applications with sketch. **(6)**

Q7 (a) Discuss the Defects in metal forming processes with suitable example and neat diagrams. **(6.5)**

(b) Explain the construction and working of resistance welding with neat diagram and applications. **(6)**

Unit-IV

Q8 (a) Discuss the concept of Directional principles and Solidification with suitable examples and applications. **(6.5)**

(b) Explain the working of die casting with neat diagram and applications. **(6)**

Q9 (a) Explain with suitable example the difference between shearing dies and stretch forming with neat diagram. **(6.5)**

(b) Explain construction and working of Ultrasonic Welding with suitable diagram along with merits and demerits. **(6)**

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] DECEMBER 2015-JANUARY 2016

Paper Code: ETME-207	Subject: Material Science and Metallurgy
Time: 3 Hours	Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory. Internal choice is indicated.

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OR

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