FACULTY OF ENGINEERING

B.E. 2/4 (Civil) II – Semester (Suppl.) Examination, January 2016

Subject: Mechanical Technology

Time: 1½ Hours   **Max.Marks: 37**

Note: Answer all questions from Part A. Answer any three questions from Part B.

PART – A (13 Marks)

1   What are the types of bulldozers?   (2)

2   What are the applications of screw conveyors?   (3)

3   Differentiate between construction elevator and passenger lift.   (3)

4   What are the advantages of vibrating screens over stationary screens?   (3)

5   Name manufacturing method and material of rock drill.   (2)

PART – B (3x8=24 Marks)

6   Explain the construction and operations of a Clamshell with a neat sketch.   (8)

7   Discuss the working principle and applications of an Aerial Ropeway.   (8)

8   Differentiate between Hoist Winch and Worm Geared chain hoists.   (8)

9   a) Explain the working principle and applications of Concrete Pump.   (5)

    b) Discuss the construction and operation of a Jaw Crusher.   (3)

10 a) Explain the working principle and applications of Reciprocating Air Compressor.   (5)

    b) Enlist the advantages and applications of concrete vibrator.   (3)

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FACULTY OF ENGINEERING

B.E. 2/4 (Inst.) II - Semester (Suppl.) Examination, January 2016

Subject : Thermodynamics and Fluid Mechanics

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Explain the concept of Entropy.

2 How many laws are there in Thermodynamics, explain them briefly?

3 Out of two and four stroke cycle, which one is more efficient and why?

4 Which one is more efficient-single or multi-stage compressor and why?

5 Differentiate between Impulse and Reaction Turbine, and which one is more efficient and why?

6 How do you classify the fluids, briefly explain?

7 Define dynamic and kinematic viscosities with their respective units.

8 Define stream line function and types of fluid flow with their mathematical expressions.

9 How do you define Reynolds number and briefly state their significance?

10 How do you overcome cavitation in a Pump? Briefly explain.

PART – B (50 Marks)

11 (a) Discuss about the concept of enthalpy, internal energy and the work done with respect to a system.
   (b) Draw the p-v diagram of Otto and Dual combustion cycles and briefly explain.

12 (a) The velocity potential function (ϕ) is given by an expression:
   $W = -xy^3/3 - x^2 + x^3Y/3 + y^2$
   (i) Find the velocity components in x and y directions.
   (ii) Show that ϕ represents a possible case of flow.
   (b) By using the continuity equation for a two dimensional flow, show that existence of ψ means it is a case of fluid flow.

13 (a) Briefly describe the overall efficiency of a steam turbine.
   (b) Describe briefly the Joule cycle of gas turbine.

14 (a) Explain the concept of Bernoulli's equation in the context of fluid flow.
   (b) Briefly describe Hagen-Poiseuille law and Darcy-Weisbach equations.

15 (a) Which of the two are more efficient-centrifugal pump or reciprocating pump and why? Briefly explain.
   (b) Draw the primary velocity triangles of a centrifugal pump and explain.

16 (a) Explain the basic working principle of Francis, Kaplan turbines and Pelton wheel and compare their efficiencies and power output.

(b) A single cylinder 4-stroke oil engine gives out the following data over a test:
Brake wheel diameter: 65 cm; Rope dia. =3 cm; speed = 450 rpm; Load on   band = 260N; Spring balance reading =40N; Area of indicator diagram = 6.5 cm; Spring stiffness = 12 bar / cm; Bore = 11 cm; Stroke = 16cm; Specific fuel consumption = 0.3129 kg/kwh; c.v of fuel = 41868 kj/kg. Estimate the bp, ip, mechanical efficiency, indicated thermal efficiency and brake thermal efficiency.

17   Write short notes on the following:
(a) orifice eter
(b) Venturimeter
(c) Concept of continuity.

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FACULTY OF ENGINEERING

B.E. 2/4 (M/P) II – Semester (Supplementary) Examination, January 2016

Subject : Thermodynamics

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 What is a system and surrounding?
2 What is thermodynamic equilibrium?
3 Explain the concept of Internal energy.
4 Write the relation between COP of heat pump and COP of refrigerator.
5 Distinguish between enthalpy and entropy.
6 How do you distinguish between svdp work and spdv work?
7 Give the statement of carnot's theorem. What does it mean?
8 Explain the critical state of a substance.
9 Write the order of efficiencies when the compression ratio is max in a otto, diesel and dual cycle.
10 Write the relations between mole fraction and mass fraction.

PART – B (50 Marks)

11 a) Write the differences between the intrinsic and extrinsic properties.   4
   b) Define reversibility and irreversibility with suitable examples and causes for irreversibility.   6

12 a) Prove the equivalence of Kelvin-plank statement and classius statement.   6
   b) Show that the reversible heat engine efficiency is higher than the irreversible engine   4

13 A Carnot engine operating a hot reservoir at 1200K and cold reservoir at 1000K is to derive a Carnot refrigerator removing heat Q_c from a reservoir at temperature 500K and rejecting heat at temperature 1000K.
   i) What is the minimum amount of heat that is to be taken from the reservoir at 1200K to remove 200kJ/min from the coolest reservoir at temperature T_c?
   ii) Also find the heat rejected by the heat pump to the reservoir at temperature 1000k.   10

14 a) Define entropy? Derive an entropy change for a isothermal process.   5
   b) Air at 15^0C and 1.05 bar occupies a volume of $0.02m^3$. The air is heated at constant volume until the pressure is 4.2 bar and then cooled at constant pressure back to the original temperature. Calculate i) the net heat flow to or from the air and ii) the net entropy change sketch the process on T-S diagram.   5

15 A vessel having a volume of $0.6m^3$ contains 3kg of liquid, water and water vapour mixture in equilibrium at a pressure of 0.5 MPa. Calculate

   i)   mass and volume of liquid, and   ii) mass and volume of vapour   10

16 a) Explain the processes involved in Rankine cycle with a neat sketch and derive its efficiency.
   b) Derive efficiency for the diesel engine and explain process involved in it with a neat sketch of P-V and T-S diagram.

17 Write short notes from the following :
   a) Internal energy is a point function
   b) latent heat of vaporization
   c) triple point of a pure substance
   d) classius inequality

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FACULTY OF ENGINEERING

B.E. 2/4 (AE) II – Semester (Supplementary) Examination, January 2016

Subject : Thermal Engineering

Time : 3 hours   Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 Differentiate between point functions and path functions with examples.
2 Explain the terms i) Intensive property   ii) thermal equilibrium
3 Write about PMM II.
4 List the limitations of first law of thermodynamics.
5 Draw Rankine cycle on h-s plot and label the processes.
6 Write down the exit velocity relation for a steady flow through nozzle.
7 What is the effect of cooler on the size of receiver used for storing compressed air.
8 List desirable properties of a refrigerant.
9 Explain forced convection heat transfer.
10 What is the application of Plank's law.

PART – B (50 Marks)

11 In a Nozzle, at the inlet, the enthalpy of the fluid passing is 3000 kJ/Kg and the velocity is 60m/sec. At the outlet, the enthalpy of the fluid passing is 2762 kJ/Kg. The nozzle is horizontal and there is no heat loss from it.
   i)   Find the velocity at the outlet from the nozzle.
   ii) If the inlet area is 0.1 m² and the specific volume at inlet is 0.1187 m³/kg, find the mass flow rate.
   iii) If the specific volume at the nozzle outlet is 0.498 m³/Kg, find the exit area of the nozzle.

12 3 kg of an ideal gas is expanded from a pressure of 7 bar and a volume of 1.5m³ to a pressure of 1.4 bar and a volume of 4.5 m³. Determine   i) specific gas constant ii) initial and final temperature and   iii) change in entropy during the process.

13 Explain the concepts of reheating and regeneration employed in gas turbines with the help of neat sketches. Draw T-s diagrams for the same.

14 A two stage compressor with perfect inter cooling takes in air at 1 bar pressure and 27°C. The law of compression in both stages is $PV^{1.3}$ = constant. The compressed air is deliverted at 9 bar from H.P. cylinder to an air receiver. Calculate per kg of air :
   -
   i)   The minimum work done
   ii) Heat rejected in inter cooler and
   iii) Minimum work done in a four stage compressor under the same conditions.
        Take R_{air} = 287 J/kg°K and $C_{p(air)}$ = 1005 J/kg°K

15 A thin walled concentric tube heat exchange is used to cool engine oil from 160^0C to 60^0C and water, which is available at 25^0C acts as a coolant. The oil and water flow rates are each 2 kg/s and the diameter of inner tube is 0.5m and the corresponding value of overall heat transfer coefficient of 250 W/m^2 ^{0}K. How long must the heat exchanger must be to accomplish the desired cooling. Take C_p of water as 4.187 kJ/kg-K and C_p of engine oil as 2.035 kJ/kg-K.

16 a) Explain the application of First law of thermodynamics for steady flow of gas through a turbine considering heat loss from the turbine. Obtain expression for work output.

   b) Explain the concepts of heat pump and refrigerator using second law of thermodynamics. Obtain expressions for coefficient of performance for both devices.

17 a) Differentiate open and closed type gas turbine cycles. Draw T-s plots.

   b) Discuss the working principle of vapour compression refrigeration.

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FACULTY OF INFORMATICS

B.E. 2/4 (I.T.) II - Semester (Suppl.) Examination, January 2016

Subject : Data Communications

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1 List various transmission impairments. (2)
2 Encode the following bit pattern using HDB 3 encoding scheme. (3)
   1010 0000 0000 1011
3 List the functions of data link layer. (2)
4 Consider the use of 2000 bit frames on a 2Mbps satellite channel with 270ms delay. Find the maximum link utilization for stop and wait flow control. (3)
5 Differentiate between synchronous TDM and statistical TDM. (2)
6 Write the characteristics of ADSL. (3)
7 Briefly explain the need for Medium Access Control. (2)
8 Differentiate between Fast Ethernet and Gigabit Ethernet. (3)
9 Briefly explain the concept of frequency reuse. (2)
10 Differentiate scatternet and piconet. (3)

PART – B (50 Marks)

11 (a) Draw and explain the fields of TCP header format. (5)
   (b) Explain about Pulse Code Modulation. (5)

12 (a) Explain about the frame structure and operation of HDLC. (6)
   (b) Explain the difference between Goback-N ARQ and selective Retransmit ARQ. (4)

13 (a) Explain about ATM service categories. (5)
   (b) Compare circuit switching and packet switching techniques. (5)

14 (a) Explain about the protocol architecture of IEEE 802.3 (6)
   (b) Discuss about CSMA / CD indetail. (4)

15   Discuss about the evolution of cellular networks. (10)

16 (a) Explain about FSK and PSK modulation schemes. (5)
   (b) Show how Cyclic Redundancy Checking can be used for error detection. (5)

17   Write short notes on any **two** of the following:
       (a) FDM (5)
       (b) Frame Relay (5)
       (c) IEEE 802.11 (5)

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