

FACULTY OF ENGINEERING**B.E. 2/4 (Civil) II – Semester (Old) Examination, December 2016****Subject: Mechanical Technology (Part – B)****Time: 1½ Hour****Max.Marks: 37****Note: Answer all questions from Part A. Answer any three questions from Part B.****PART – A (13 Marks)**

- 1 List out the functions of Shovels with a neat sketch. (3)
- 2 Differentiate cable and clamshell excavator. (3)
- 3 What is Aerial ropeway? (2)
- 4 Where Guyed and Stiffy derricks are used? (3)
- 5 What are the applications of Hammer crusher? (2)

PART – B (3x8 = 24 Marks)

- 6 a) What precautions to be taken while operating any Earth moving equipment? (5)
b) Briefly list out the functions of a Tractor. (3)
- 7 a) Which is faster and more secure ----Belt conveyor or Screw conveyor and why? (3)
b) Explain the applications of Fork lift truck,its need and how the name is derived. (5)
- 8 a) Explain salient features of Swing and Non-swing mobile crane and its specific applications. (4)
b) What are the functions of a Crusher's jaw and Roll crushers. (4)
- 9 a) Explain with a neat sketch the functioning of a Pneumatic Jack hammer. (5)
b) Why Concrete vibrator is required--- explain. (3)
- 10 Write short notes on the following: (8)
 - a) Apron conveyor.
 - b) Cable excavator.
 - c) Trencher.
 - d) Shaking and Vibrating screen.

FACULTY OF ENGINEERING**B.E. 2/4 (Civil) II – Semester (New) (Suppl.) Examination, December 2016****Subject: Mechanical Technology (Part – B)****Time: 1½ Hour****Max.Marks: 37****Note: Answer all questions from Part A. Answer any three questions from Part B.****PART – A (13 Marks)**

- 1 What are Paving breaker, Pneumatic jack hammer and Rock drill. (3)
- 2 Differentiate Earth moving and Excavating equipments. (3)
- 3 Differentiate between Screw conveyor and Belt conveyor. (2)
- 4 Define Gyrating crusher. (2)
- 5 Where Paving breaker is used? (3)

PART – B (3x8 = 24 MARKS)

- 6 a) Explain Shovels and Drag lines. (4)
b) Differentiate Bulldozers and Earth compactors. (4)
- 7 a) List different applications of Screw conveyor and Apron conveyor. (4)
b) List out the advantages and disadvantages of Hoist winch and differential and Worm geared chain hoists. (4)
- 8 a) With a neat sketch, bring out the applications of Construction elevator and Bucket elevator. (5)
b). Briefly bring out the use of Whirler. (3)
- 9 a) With a neat sketch, describe Shaking and Vibrating screens and their applications. (5)
b) How Concrete pumps are different from any other conventional pumps? (3)
- 10 Explain Multistage reciprocating air compressor with a neat sketch. (8)

FACULTY OF ENGINEERING
B.E. 2/4 (Inst.) II-Semester (Old) Examination, December 2016

Subject : Thermodynamics and Fluid Mechanics

Time : 3 Hours

Max. Marks: 75

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

PART – A (25 Marks)

1. State the principle of increase of Entropy.
2. Which process does Dual cycle differ from Otto cycle?
3. Sketch Brayton cycle on T-s plot.
4. Write the relation for work done in a single stage reciprocating air compressor.
5. Define non uniform flow.
6. How is streakline different from streamline?
7. What is the function of draft tube in a reaction turbine?
8. State Darcy's formula and its application.
9. What is the need of an air vessel in a reciprocating pump?
10. List two differences between reciprocating and centrifugal pumps.

PART – B (50 Marks)

- 11.(a) Drive Clausius Inequality relation. What is its application? (5)
 (b) Draw T-s plots for Otto, Diesel and Dual Cycles. Explain their differences. (5)
- 12.(a) Discuss the effect of clearance volume on work done in a single stage reciprocating air compressor. (6)
 (b) Compare reaction type and impulse type Steam turbines. (4)
- 13.(a) In a two dimensional incompressible flow, the velocity potential function for the flow is given as $x(2y-1)$. At a point (4, 5), determine velocity vector and its magnitude and value of Stream function. (6)
 (b) Discuss the classification of fluid flows. (4)
14. Explain the working principle of Pelton wheel Turbine with a neat sketch. What are the relations for work done and efficiency. (10)
- 15.(a) Explain the working mechanism of a reciprocating pump with a neat sketch. (6)
 (b) Write short notes on cavitation and its effects. (4)
16. 4 kg of air is compressed from 40°C and 125°C kPa to 250°C and 875 kPa. it is then throttled to 57 kPa. Finally it is cooled to a pressure of 125 kPa and 180°C . Calculate the overall change in entropy and also entropy change for each process. (10)
17. Obtain expression for volume flow rate through an venturimeter using Bernoulli's equation. (10)

FACULTY OF ENGINEERING**B.E. 2/4 (Inst.) II – Semester (New) (Suppl.) Examination, December 2016****Subject: Thermodynamics & Fluid Mechanics****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 Explain the concept of Internal energy and Enthalpy.
- 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 stage 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 (5x10 = 50 Marks)

- 11 a) Discuss about the concept of Clausius inequality and principles of increase in entropy in irreversible process.
b) Draw the p-v diagram of Otto and Dual combustion cycles and briefly explain.
- 12 a) Define a fluid. Discuss types of flows.
b) By using the continuity equation for a two dimensional flow, show that existence of 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 attest:
Brake wheel diameter: 65 cm; Rope dia. = 3 cm; speed = 450 rpm; Load on band =270 N; spring balance reading = 40N; Area of indicator diagram = 6.5 cm; spring stiffness =12 bar/cm; Bore = 11 cm; Stroke =16 cm; 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) Darcy's friction factor 'f'
 - b) Critical Reynold's number
 - c) Moody's chart

FACULTY OF ENGINEERING**B.E. 2/4 (M / P) II – Semester (New)(Suppl.) Examination, December 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 Distinguish between intensive and extensive properties with examples.
- 2 State Zeroth law of thermodynamics. Explain how it is basis for the temperature measurement.
- 3 Explain thermodynamic work.
- 4 Prove that energy is a property of a system.
- 5 Explain PMM2.
- 6 What is Gibb's function? Mention its applications.
- 7 What is a pure substance? Can air be treated as a pure substance?
- 8 Show phase equilibrium diagram on P-T coordinates for water.
- 9 Mention the thermodynamic processes constituting a Rankine cycle.
- 10 State Amagat-Leduc law of partial volumes.

PART – B (5x10 = 50 Marks)

- 11 a) Distinguish between ideal gas and perfect gas. 4
 b) A new temperature scale in degrees N is designed with freezing point at 100 °N and the boiling point at 400 °N. Establish a correlation between degrees Celsius and degrees N. What would be the absolute temperature at °N? 6
- 12 Air at 1.06 bar and 7°C is heated at constant volume to a temperature of 847°C. It is then expanded adiabatically until the pressure falls to 1.06 bar, following which heat is rejected at constant pressure until the temperature is brought back to 7°C. Determine per kg of air
 a) Change in internal energy in each operation
 b) Heat input of the cycle
 c) Work output of the cycle
 Take $R = 0.287 \text{ kJ/kg-K}$, $C_v = 0.718 \text{ kJ/kg-K}$.
- 13 a) Write down SFEE and simplify for a boiler and a compressor. 4
 b) State Kelvin-Planck statement and Clausius statement of second law of thermodynamics and also show that the violation of Kelvin-Planck statement leads to the violation of clausius statement. 6

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- 14 a) Derive an expression for the change in entropy during a polytropic process. 4
- b) 2 Kg of air at a pressure of 15 bar and 300°C expands polytropically to 1.5 bar. Calculate:
- i) Work done
 - ii) Final temperature
 - iii) Heat transferred and change in entropy if the index of the process is 1.25. 6
- 15 A vessel having a capacity of 0.05 m³ contains a mixture of saturated water and saturated steam at a temperature of 245°C. The mass of the liquid present is 10 Kg. Find the following:
- i) Pressure
 - ii) Mass
 - iii) Sp. Volume
 - iv) Sp. Enthalpy
 - v) Sp. Entropy and
 - vi) Sp. Internal energy 10
- 16 a) Derive first and third Maxwell's equations. 6
- b) A vessel contains 10 Kg of oxygen, 8 kg of nitrogen and 25 kg of carbon dioxide at 375 K temperature and 2.5 bar pressure. Make calculations for the capacity of the vessel and the total pressure in the vessel when the temperature is raised to 450 K. 4
- 17 Derive an expression for the air standard efficiency of a Diesel cycle. 10

FACULTY OF ENGINEERING**B.E. 2/4 (M/P) II-Semester (Old) Examination, December 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 are “specific extensive properties”? Give any two examples. 2
- 2 Explain the law on which thermometers function. 3
- 3 Define flow work. 2
- 4 Using the first law of thermodynamics for a closed system undergoing a process, show that $C_p - C_v = R$. Which process is suitable for proving the given relation? 3
- 5 Three reversible heat engines A, B and C operate on helium, argon and carbon-dioxide, respectively, as working substances. Which of the above heat engines has higher thermal efficiency? Explain with reason. 3
- 6 Derive the relationship between the COP of a reversible refrigerator and efficiency of a reversible heat engine. 2
- 7 Draw the phase equilibrium diagram for a pure substance on p-T co-ordinates. Why does the fusion line for water has negative slope. 3
- 8 Define the terms : saturation state and triple point of water. 2
- 9 Represent Otto cycle on p-v and T-S co-ordinates. 3
- 10 Define mole fraction and mass fraction for mixture of gases. 2

PART – B (50 Marks)

- 11 With a neat sketch, explain the construction and the working principle of a constant pressure ideal gas thermometer. 10
- 12 a) Prove that “energy is the property of a system”. 3
 b) An ideal gas undergoes a thermodynamic cycle consisting of the following processes : i) 1-2 : Constant pressure $P = 1.4 \text{ bar}$, $V_1 = 0.028 \text{ m}^3$, $W_{1-2} = 10.5 \text{ kJ}$
 ii) 2-3 : Compression with $PV = \text{constant}$, $U_2 = U_3$ iii) 3-1 : constant volume, $U_1 - U_3 = -26.4 \text{ kJ}$. There are no significant changes in KE and PE. Sketch the cycle on P-V co-ordinates and calculate the network for the cycle in kJ and the heat transfer for the process 1-2. Also, show that for the cycle $Q = W$. 7
- 13 a) Explain Kelvin-Planck and Clausius statements using schematic diagrams. 5
 b) State and prove Clausius theorem. 5
- 14 Steam initially at 0.3 MPa , 250°C is cooled to 80°C at constant volume.
 a) Represent the process on p-v co-ordinates b) At what temperature will the steam become saturated vapour? c) What is the quality of steam at 80°C .
 Also, d) Determine the heat transfer per kg of steam in cooling the steam from 250°C to 80°C . (Solve using steam tables). 10

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- 15 Explain Diesel cycle with help of p-v and T-S diagrams. Derive an expression for the air standard efficiency of Diesel cycle engine in terms of the compression ratio (r_k) and cut-off ratio (r_c). Show that, for the same compression ratio (r_k), the air standard efficiency of the Diesel cycle is always less than that of the Otto cycle. 10
- 16 a) Using the steady flow energy equation (SFEE), prove that the work transfer for an open system is $W = -\int v dp$. 4
- b) Air flows steadily at the rate of 2 kg/s through an air compressor, entering at 6 m/s with a pressure of 1 bar, and a specific volume of $0.85 \text{ m}^3/\text{kg}$ and leaving at 4 m/s, 6.9 bar and $0.16 \text{ m}^3/\text{kg}$. The internal energy of the air leaving is 80 kJ/kg greater than that of the air entering. The cooling water jacket absorbs heat from the air at the rate of 60 kJ/s. Compute a) the power required to drive the compressor, b) the ratio of the inlet pipe and the outlet pipe cross-sectional areas. 6
- 17 a) Explain PMM-1 and PMM-2 with schematic diagrams. 4
- b) Derive an expression for heat transfer for a closed system undergoing a polytropic process. 6

FACULTY OF ENGINEERING**B.E. 2/4 (AE) II – Semester (Old) Examination, December 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 State the steady flow energy equation and its applications.
- 2 What do you understand PMM-2?
- 3 What are the similarities in heat and work?
- 4 State Stefan Boltzman Law.
- 5 State and explain first law of thermodynamics.
- 6 Define and explain Clausins inequality.
- 7 Write advantages and disadvantages of gas turbine.
- 8 Write desirable properties of an ideal refrigeration.
- 9 Write concept of black body and grey body radiation.
- 10 Define free convection and forced convection.

PART – B (5x10 = 50 Marks)

- 11 A Gas Turbine Unit developing 15 MW power has at its inlet, $h_1 = 1100$ kJ/kg and velocity (V_1) = 50 m/s. At the exit enthalpy (h_2) = 300 kJ/kg and exit velocity (V_2) = 200 m/s. If the mass flow rate through the turbine is 20 kg/s. Calculate the rate of heat rejection from the turbine.
- 12 Derive the equation for work done in polytropic process and isothermal process.
- 13 a) Explain vapour absorption refrigeration system with neat sketch.
b) Write limitations of first law of thermodynamics.
- 14 A gas of volume 0.014 m^3 expands polytropically from a pressure of 2.07 MPa to 207 kPa. The polytropic exponent $n = 1.35$. Determine work done by the gas during expansion.
- 15 a) Derive the expression for heat flow through hollow cylinder.
b) State Newton's law of cooling and define the thermal resistance for convective heat transfer.
- 16 State and explain:
 - i) Fourier's law of conduction
 - ii) Boltzman's law of radiation
 - iii) Physical significance of critical radius of insulation
- 17 Write short notes on reheating, inter cooling and regeneration in gas turbine.

FACULTY OF ENGINEERING**B.E. 2/4 (A.E) II – Semester (New) (Suppl.) Examination, December 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 Define thermodynamics. How it is different from heat transfer?
- 2 What do you understand by intensive and extensive properties?
- 3 What is meant by flow of work?
- 4 Define a heat engine, refrigerator and a heat pump.
- 5 What is a perpetual motion machine of 2nd kind (PMM-II)?
- 6 State the applications of compressed air.
- 7 Define the terms:
 - a) Refrigeration
 - b) COP
- 8 State the advantages and disadvantages of gas turbines over IC engines.
- 9 State and briefly explain Fourier's law of conduction.
- 10 Explain the physical significance of critical radius of insulation.

PART – B (5x10 = 50 Marks)

- 11 Obtain the equations for work done during various non flow processes
 - i) Isothermal Process
 - ii) Adiabatic Process
- 12 Air is escaping through a nozzle attached to a large reservoir with an inside temperature 127°C and atmosphere at 27°C. What is the velocity of air at the exit of nozzle? Take C_p of air as 1.005 kJ/kg K.
- 13 A Reversible Engine operating between 600°C and 40°C. This engine drives a reversible refrigerator operating between 40°C and -18°C still there is a net work output of 370 kJ and the heat received by the engine is 2100 kJ. Determine the cooling effect.
- 14 Explain the concept of reheating and regeneration employed in gas turbines with the help of neat sketches. Draw T-S diagrams for the same.
- 15 Explain the working principle of vapour compression refrigeration system using P-H diagram and T-S diagram.
- 16 A thin walled concentric tube heat exchanger is used to cool engine oil from 160°C to 60°C and water which is available at 25°C acts as a coolant. The oil and water flow rates are each 2 kg/s and the diameter of inner tube is 0.5 m and the corresponding value of overall heat transfer coefficient of 250 W/m²K. 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.
- 17 Derive the expression for overall thermal conductivity for heat transfer through a composite cylindrical wall.

FACULTY OF INFORMATICS**B.E. 2/4 (I.T.) II – Semester (New) (Suppl.) Examination, December 2016****Subject: Data Communications****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

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|----|---|---|
| 1 | What are the advantages of layering? | 3 |
| 2 | Define the following: | 3 |
| | a) Protocol | |
| | b) Peer process | |
| | c) Network architecture | |
| 3 | Briefly explain about Transmission impairments. | 3 |
| 4 | Differentiate BSS and ESS in WLAN. | 2 |
| 5 | Write about functions of Data link layer of TCP/IP Model. | 2 |
| 6 | Distinguish synchronous and Asynchronous transmission. | 3 |
| 7 | Give HDLC frame format. | 2 |
| 8 | Differentiate FDM and TDM. | 2 |
| 9 | What is CSMA / CD? Why is it needed in different Ethernets? | 3 |
| 10 | Differentiate Scatternet and Piconet. | 2 |

PART – B (50 Marks)

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| 11 | Explain the different encoding schemes of 'Digital data and Digital signals'. | 10 |
| 12 | a) Explain in detail about HDLC Protocol. | 6 |
| | b) Differentiate Stop and Wait and Sliding Window Protocol. | 4 |
| 13 | a) Explain ATM protocol architecture. | 5 |
| | b) Write the differences between Circuit switching and Packet switching. | 5 |
| 14 | a) Explain in detail CSMA/CD. | 5 |
| | b) Explain the MAC sub layer of Traditional Ethernet. | 5 |
| 15 | a) Explain the architecture of Bluetooth wireless technology. | 5 |
| | b) Write short notes on 3G Cellular networks. | 5 |
| 16 | a) Explain the architecture of WLAN. | 5 |
| | b) Write short notes on Zigbee. | 5 |
| 17 | Explain frame relay in detail. | 10 |

FACULTY OF INFORMATICS**B.E. 2/4 (IT) II-Semester (Old) Examination, December 2016****Subject : Data Communications****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

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|---|---|
| 1 Differentiate signal and data. | 2 |
| 2 Encode the following bit pattern using B8ZS encoding scheme.
1010 0000 0000 1011 | 3 |
| 3 List different types of errors in Data Communications. | 2 |
| 4 Define Piggy backing. | 3 |
| 5 Briefly explain the need of multiplexing. | 2 |
| 6 Distinguish between circuit switching and packet switching. | 3 |
| 7 Briefly explain the need for medium Access control. | 2 |
| 8 Write any 3 characteristics of Switched Ethernet. | 3 |
| 9 List the applications of Bluetooth. | 2 |
| 10 What is frequency reuse ratio? Which shape of the cell maximizes the frequency reuse in cellular networks? | 3 |

PART – B (50 Marks)

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| 11 a) Discuss about various transmission impairments that influence channel capacity. | 5 |
| b) Explain about Pulse Code Modulation. | 5 |
| 12 a) Explain about Stop and Wait flow control. | 4 |
| b) With the help of neat sketches, explain about Goback-N ARQ error control. Also mention its disadvantages. | 6 |
| 13 a) "Statistical TDM overcomes the drawbacks of synchronous TDM". Justify the statement. | 5 |
| b) Discuss about Frame relay. | 5 |
| 14 Write the characteristics of Bridged, switched, Fast and Gigabit Ethernets. | 10 |
| 15 Explain about the protocol architecture and services of IEEE 802.11. | 10 |
| 16 a) Encode the bit pattern 1011 1010 using NRZ-L, NRZ-I and Bipolar AMI techniques. | 6 |
| b) Differentiate Synchronous and Asynchronous transmissions. | 4 |
| 17 Write short notes on any two of the following : | |
| a) ADSL | 5 |
| b) CSMA/CD | 5 |
| c) CDMA | 5 |
