

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) II-Semester (Backlog) Examination, March /April 2021

Subject : Fluid Mechanics - I

Time : 2 Hours

Max. Marks: 75

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Note: Answer any Seven Questions

(7x3 = 21Marks)

- 1 How do you determine whether boiling or cavitation will occur in liquid using the concept of vapour pressure?
- 2 What is buoyancy?
- 3 What is a pitot tube? What is its use?
- 4 Distinguish between forced vortex and free vortex flow.
- 5 Draw a neat sketch of rotameter.
- 6 Differentiate between notches and weirs.
- 7 What do you mean by viscous flow?
- 8 Prove that the velocity of sound wave in compressible fluid is given by $c = \sqrt{k/p}$.
- 9 List out the minor losses in pipe flow.
- 10 A crude oil of kinematic viscosity 0.4 strokes is flowing through a pipe of diameter 300mm at the rate of 300 liters per sec. Find the head loss due to friction for a length of 5m of the pipe.

PART – B

Note: Answer any Three Questions

(3x18 = 54Marks)

- 11 (a) Derive the equation for Newton's law of viscosity, also explain the kinematic viscosity and its units.
(b) Two concentric cylinders of 14 and 14.3 cm diameter and each of 25 cm height are filled in between with castor oil of viscosity 0.9 N-s/m². Find the required torque to rotate the inner cylinder at 18 rpm, if the outer cylinder is stationary.
- 12 (a) Derive Euler's equation of motion in three dimensions.
(b) A 300 mm diameter pipe carries water under a head of 20 metres with a velocity of 1.5 m/s. If the axis of the pipe turns through 45°. Find the magnitude and direction of the resultant force at the bend.
- 13 (a) Explain the principle of venturimeter with a neat sketch. Derive the expression for the rate of flow of fluid through it.
(b) A pipe contains an oil of specific gravity 0.8. A differential manometer connected at the two point A and B of a pipe shows the difference in mercury level as 20 cm. Find the difference of pressure at the two points.
- 14 (a) State Bernoulli's theorem for compressible flow. Derive an expression for Bernoulli's equation when the process is adiabatic.
(b) An aero plane is flying at a height of 10km where temperature is -15°C. The speed of the plane is corresponding to Mach no, 1.4. Find the speed of the plane. Take $K=1.4$ and $R = 29.2 \text{ m}^0\text{K}$.

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- 15 (a) Derive an expression for the loss of head due to friction in pipes and derive Darcy Weisbach equation.
(b) Determine the difference in the elevations between the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 300mm and length 400m. The rate of flow of water the pipe 300 lit/sec. Consider all losses and take the value of $f = 0.008$. Draw the hydraulic gradient line (H.G.L) and Total energy line (T.E.L).
- 16 (a) State and derive Pascal's law.
(b) Briefly explain about body forces and surface forces.
- 17 Answer any **TWO**
(a) Draw neat sketches of differential manometer and explain how difference in pressure between two points is measured.
(b) Derive continuity equation. in Cartesian coordinates.
(c) Explain the significance of Reynold's experiment, also explain the Reynolds experiment.

FACULTY OF ENGINEERING**B.E 2/4 (EEE/Inst.) II-Semester (Backlog) Examinations, March /April 2021****Subject : Electro Magnetic Fields****Time : 2 Hours****Max. Marks: 75****Note: Missing Data, if any, may be suitably be assumed.****PART – A****Note: Answer any Seven Questions****(7x3 = 21Marks)**

- 1 State Columb's law
2. Give the types of charge distribution
3. What is an electric flux?
4. What is Gaussian surface? What are the conditions to be satisfied in special Gaussian surface.
5. What is rotational and irrotational vector field?
6. Define Magnetic field Intensity
7. What is Curl?
8. Estimate the distance between the given vectors A (1, 2, 3) and B (2, 1, 2)
9. Mention the properties of uniform plane wave
10. Define Reluctance

PART –B**Note: Answer any Three Questions****(3x18 = 54Marks)**

- 11 a) Explain three co-ordinate systems.
b) Obtain the unit vector in the direction from the origin towards the point p (3, -3, -2)
- 12 a) Derive an expression for force between two current carrying conductors.
b) Find the force on 3nC at (1,2,3) m due to a second charge of -0.1 nC at (2,0,5) m in the free space 5
13. a) Derive an expression for the capacitance of two wire transmission line
b) Find the potential V on z-axis at distance z from the origin when uniform line charge ρ_L in the form of ring radius a is placed in the $z=0$ plane.
14. a) Derive the expression for the magnetic field intensity due to rectangular coil carrying current I in a uniform field. Deduce the equation to find the H due to square coil.
b) An iron ring with a cross sectional area of 3cm square and mean circumference of 15 cm is wound with 250 turns wire carrying a current of 0.3A. The relative permeability of ring is 1500. Calculate the flux established in the ring.
15. a) Derive an expression for inductance of a solenoid.
b) Determine the inductance of a solenoid of 2500 turns wound length of 0.25m on a cylindrical paper tube, 4 cm in diameter the medium is air.

16. a) Derive a wave equation for non-dissipative medium making use of Maxwell equations and field vectors E and H.
b) A plane wave propagating through a medium with

$\epsilon_r = 8, \mu_r = 2$ has $E = 0.5 \sin (108 t - z) \beta z$ v/m. Determine (i) β (ii) The loss tangent (iii) wave impedance (iv) wave velocity (v) magnetic field.

17. a) Write short notes on faradays law of electromagnetic induction.
b) Derive an expression for magnetic field strength H, due to a current carrying conductor of finite length placed along the y-axis, at a point P in x-z plane and r distant from the origin.

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FACULTY OF ENGINEERING**BE 2/4 (ECE) II- Semester (Backlog) Examination, March /April 2021****Subject : Networks and Transmission Lines****Time : 2 Hours****Max. Marks: 75****Note: Missing Data, if any, may be suitably be assumed.****PART – A****Note: Answer any Seven Questions****(7x3 = 21Marks)**

1. Differentiate between image, iterative impedance in asymmetrical networks.
2. Define image transfer constant and iterating transfer constant of a Network.
3. What is Notch filter? Where it is used?
4. What are the advantages of m-derived filters over k-filters?
5. Explain the need for impedance matching networks.
6. List the properties of Positive real function.
7. What is transmission line? Draw its equivalent circuit at low and high frequencies.
8. Define Phase velocity and group velocity.
9. What are the applications of Smith chart?
10. Write on the characteristics of a quarter wave transmission Line.

PART –B**Note: Answer any Three Questions****(3x18 = 54Marks)**

11. (a) Obtain the expression for image impedance of a Asymmetrical L-network.
(b) Draw the T and Pi Network. Derive relation between T and Pi Network.
12. a) Explain how an m-derived filters are obtained form constant k-type filter. Explain both low and high pass cases and draw the clear circuits in each case.
(b) What is composite filter and draw its various sections.
13. (a) Differentiate between various methods of Network synthesis.
(b) The driving point impedance of a LC network is given by $Z(s) = (S^4 + 4S^2 + 3) / (S^3 + 2S)$. Determine the second cauer form of the network
14. (a) Derive an expression for input impedance of a finite length transmission line .
(b) A 12 kms line terminated by its characteristics impedance. At certain frequency the voltage at 1km from the sending end is 10% below that at the sending end. Find the voltage across the load impedance in terms of percentage of sending end voltage.
- 15 Compare limitations of single stub and double stub matching method. Give the steps Involved in design of single stub matching.
16. (a) Find the Open and short circuit impedance of T-network.
(b) Derive the condition for distortion-less transmission line.
17. Write short notes on
 - (a) Network synthesis methods.
 - (b) Insertion loss and attenuation

FACULTY OF ENGINEERING**BE 2/4(M/P) II Semester (Backlog) Examination, March / April 2021****Subject: Basic Electronics****Time : 2 Hours****Max. Marks: 75****Note: Missing Data, if any, may be suitably be assumed.****PART – A****Note: Answer any Seven Questions****(7x3= 21Marks)**

- 1) Define Drift current
- 2) What is TUF? What is its Significance?
- 3) What are the different regions in which BJT Operates?
- 4) What are the Advantages of JFET over BJT?
- 5) What are Damped and Undamped Oscillations?
- 6) Define negative feedback?
- 7) Draw the Half Adder circuit using only N and gates
- 8) What is Instrumentation amplifier?
- 9) Explain the role of LED in low power devices?
- 10) What is Thermo couple?

PART – B**Note: Answer any Three Questions****(3x18= 54Marks)**

- 11)a. Compare the Half wave rectifier and Full wave rectifier with respect to all the parameters?
b. Compare Avalanche and Zener Breakdown
- 12)a. Draw the circuit of a simple CE amplifier and derive the output for it?
b. Explain the Construction and working of N-channel JFET
- 13)a. Draw the Hartley Oscillator and Derive the Equation for Frequency of Oscillations.
b. Draw the Crystal Oscillator and Write the Equations for Frequency of Oscillations.
- 14)a. What are the Characteristics of Ideal Op-Amp?
b. Implement Full Subtractor using suitable logic gates
- 15)a. Explain the Construction and working of LVDT
b. Mention applications of Transducers
- 16)a. Explain the construction of SCR
b. Draw and explain the V-I characteristics of SCR
17. Write short notes on
 - a. Filters
 - b. Strain Gauge
 - c. Photo Transistor

FACULTY OF ENGINEERING**BE 2/4 (AE) II-Semester. (Backlog) Examination, March /April 2021****Subject : Thermal Engineering****Time : 2 Hours****Max. Marks: 75****Note: Missing Data, if any, may be suitably be assumed.****PART – A****Note: Answer any Seven Questions****(7x3 = 21Marks)**

1. What is PMM-1. Why it is impossible.
2. What is adiabatic process. How does it differ from isentropic process.
3. What is thermal reservoir? Explain the term source and sink.
4. What is principle of increase of entropy.
5. Sketch P-V diagram of Rankine cycle. Explain the processes.
6. Differentiate between Nozzle and Diffuser.
7. State the uses of compressed air in engineering applications.
8. What are eco friendly refrigerants.
9. Define Weins displacement law.
10. Differentiate between forced and free convection.

PART – B**Note: Answer any Three Questions****(3x18 = 54Marks)**

11. In a gas turbine unit, the gases flow through the turbine is 15kg/s and the power developed by the turbine is 12000kW. The enthalpies of gases at the inlet and outlet are 1260kJ/kg and 400kJ/kg respectively, and the velocity of gases at the inlet and out let are 50m/s and 110m/s respectively, Calculate:(i) the rate at which heat is rejected to the turbine and (ii) the area of the inlet pipe given that the specific volume of the gases at the inlet is 0.45m³/kg.
12. (a) Drive an expression for entropy change for a closed system in a Polytropic process.
(b) A domestic food freezer maintains a temperature of -15°C. The ambient air temperature is 30°C. If heat leaks into the freezer at continuous rate of 1.75kJ/s what is the least power necessary to pump this heat out continuously.
13. (a) Explain how the process of regeneration improves efficiency.
(b) A steam power plant works between 40bar and 0.05 bar if the steam supplied is dry saturated and the cycle of operation is Rankine find;(i) cycle efficiency
(ii) specific steam consumption.

- 14 (a) Explain the working of simple vapour absorption refrigeration system.
- (b) A single stage single acting air compressor delivers 0.6kg of air per minute at 6 bar. The temperature and pressure at the end of suction stroke are 30°C and 1 bar. The bore and stroke of the compressor are 100mm and 150mm respectively, the clearance is 3% of the swept volume. Assuming the index of compression and expansion to be 1.3, find
- volumetric efficiency of the compressor
 - Power required if the mechanical efficiency is 85% and
 - Speed of the compressor (rpm)
- 15 (a) Explain the concept of thermal boundary layer.
- (b) A mild steel tank of wall thickness 12mm contains water at 95°C. the thermal conductivity of mild steel is 50W/m°C, and the heat transfer coefficients for the inside and outside the tank are 2850 and 10w/m²°C., respectively. If the atmospheric temperature is 15°C, calculate
- the rate of heat loss per m² of the tank surface area
 - the temperature of the outside surface of the tank.
- 16 (a) What is composite wall. Derive an expression for overall heat transfer in a composite wall.
- (b) Explain Reversed Carnot cycle and draw T-S and P-V diagram.
- 17 (a) Explain Carnot Theorem
- (b) Derive steady flow energy equation.

FACULTY OF ENGINEERING**B.E. 2/4 (CSE) II-Semester (Backlog) Examination, March /April 2021****Subject : Microprocessor and Interfacing****Time : 2 Hours****Max. Marks: 75****Note: Missing Data, if any, may be suitably be assumed.****PART – A****Note: Answer any Seven Questions****(7x3 = 21Marks)**

1. What are the functions of HOLD and HLDA pins of 8085 microprocessors?
2. Write about 16 bit data transfer and arithmetic instructions in 8085
3. Why stack is used in a program? How it is initialized?
4. Write down the applications of DAC and ADC
5. List the signals of RS232C serial Interface
6. What are the modes of Intel 8253 programmable interval timer
7. Outline the key features of 8051 microcontroller architecture.
8. Specify the registers used in 8051 microcontroller
9. List the features of advanced microprocessors
10. Explain the addressing modes of 80386 microprocessor

PART – B**Note: Answer any Three Questions****(3x18 = 54Marks)**

11. a. Explain program manipulation instructions in 8085 micro processor
b. Draw and explain architecture of 8085 microprocessor.
12. a. How do you Interface Analog to Digital converters with 8085 microprocessors?
Explain
b. Explain operation of DMA controller with neat diagram
13. a. Describe serial and parallel bus standards
b. Briefly explain about Display controller (8279)
14. a. Describe modes of operation of 8051
b. Draw internal RAM organization of 8051
15. a. What is RISC processor? Explain its advantages
b. Discuss about 8086 logical signals
16. a. Write a program using ADI instruction to add two numbers 4AH and 58H and to display the answer at an output port
b. Write about RST 7.5 micro processor
17. a. What is the purpose of programmable Interval Timer
b. How many types of interrupts are there in 8051 microcontroller? Explain

FACULTY OF ENGINEERING
BE 2/4 (IT) II-Semester (Backlog) Examination, March / April 2021

Subject: Computer Organization and Microprocessor

Time: 2 hours

Max. Marks: 75

Note: Missing Data, if any, may be suitably be assumed.

PART – A

Answer any seven questions.**(7x3=21 Marks)**

- 1 Write any two differences between serial and parallel interface.
- 2 Analyze the Interrupts with example.
- 3 Draw the Instruction execution cycle for memory read operation with related signals.
- 4 Perform RLC, RAR operation on given data
11110000 with $ci=1$
- 5 Write an assembly language program to perform 1's complement of given number.
- 6 Interpret the methods to increase the performance of processor.
- 7 Define memory interleaving technique.
- 8 Write a control word to reset the data in D5 position using BSR mode of 8255.
- 9 Explain parallel bus standard connection of RS 232C.
- 10 Differentiate the modes of 8257 DMA controller.

PART – B

Answer any three questions**(3x18 = 54Marks)**

- 11 (a) Analyze the generations of computer.
(b) Explain the operation of Accessing of I/O device.
- 12 Define DMA. Analyze the arbitration techniques of DMA Controller with neat sketch.
- 13 Evaluate the different mapping techniques with memory field structure.
- 14 (a) Write a program to subtract two 8-bit numbers using 8085.
(b) Explain Instruction set of 8085 with example.
- 15 Explain the operation of 8251(USART) and its interfacing in detail.
- 16 (a) Evaluate the Pin configuration of 8085.
(b) Explain single bus structure.
- 17 Write notes on
 - (a) Interrupt Controller (8259)
 - (b) Cache memory

FACULTY OF ENGINEERING**B.E. (Civil) IV-Semester (CBCS) (Backlog) Examination, March / April 2021****Subject : Surveying-II****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

- 1 Write the temporary adjustments of a Theodolite?
- 2 Describe the Basic working principle of EDM?
- 3 Define axis signal correction?
- 4 What are the advantages of traversing by included angle method and bearings method?
- 5 Write the characteristics of Transition curve?
- 6 State the elements of reverse curve with a sketch labeled with component parts?
- 7 Define sight distance along a summit vertical curve?
- 8 Illustrate the possible formations of summit-vertical curves based on adjacent grade lines?
- 9 Define format and lens angle?
- 10 What is flight planning in case of remote sensing.

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

- 11 a) What is a phase of a wave and how it is useful for measurement of distances?
b) Explain repletion method of measurement of horizontal angles and state its specific application?
- 12 a) A theodolite was setup at 200m from an electric pole. The angles of depression and elevation to the base and top of the pole respectively are $2^{\circ} 35'$ and $7^{\circ} 56'$. Given that the height of the instrument is 1.50m and that the RL of the ground level is 220.515m, determine height of the pole.
b) A closed compass traverse survey was conducted round a compound wall and the WCB were observed. Determine which of the stations are affected by local attraction and calculate their corrected bearings.

<u>Line</u>	<u>Fore Bearing</u>	<u>Back Bearing</u>
PQ	$74^{\circ} 20'$	$256^{\circ} 00'$
QR	$107^{\circ} 20'$	$286^{\circ} 20'$
RS	$224^{\circ} 50'$	$44^{\circ} 50'$
SP	$306^{\circ} 40'$	$126^{\circ} 00'$

- 13 a) Briefly describe any three linear methods of setting out of a simple circular curve?
b) Calculate the necessary data for setting out of a curve of 11 chains radius to connect between two tangents by offsets from chords produced. Take peg interval = 150 links, length of each chain = 30m. Two tangents intersect at chainage 60+66, the deflection angle being 60 degrees.

- 14 a) Calculate the RL of various stations pegs on a vertical curve connecting two uniform grades of +0.5% and -0.75%. The challenge and RL of point of intersection are 650.00m and 360.750m, respectively. Take the rate of change of grade as 0.11% per 30m.
b) State the assumptions made for computation of settingout data of vertical curves?
- 15 a) Explain the segments and their relationship in GPS?
b) Explain basic principle of remote sensing, the different types of remote sensing and also the types of sensors used?
- 16 a) Explain any two permanent adjustments of a transit Theodolite?
b) Explain how sight distance on sag curve passing under an overhead structure?
- 17 Write a short note on
(a) Types of Total stations
(b) Obstructions in ranging of simple circular curve
(c) Elements of satellite based survey

FACULTY OF ENGINEERING**B.E. IV Semester (EEE) (CBCS) (Backlog) Examination, March/April 2021****Subject: Power System-I****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

- 1 Define diversity factor and plant usage factor.
- 2 Explain block rate tariff and two part tariff.
- 3 What are the major components of steam power plants?
- 4 Define base load and peak load plants.
- 5 What are the factors considered for selection of site for Nuclear power plant?
- 6 Compare flat and concentrating type solar collectors.
- 7 What are the methods of equalizing potential across a string of insulators?
- 8 List out the advantages of bundled conductors.
- 9 Write the various methods of improving string efficiency.
- 10 What you understand by GMR and GMD of a transmission line?

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

- 11 a) Discuss about different types of tariffs.
b) Explain the function of Economizer and air pre heater.

12 The average monthly discharge (Q) measured at a site is given below

Week	1	2	3	4	5	6	7	8	9	10	11	12
Q (m ³ /Sec)	1800	1900	1350	1200	1300	3000	4100	3500	1500	1300	1100	1000

- a) Calculate the average discharge available and
b) Plot mass curve
- 13 a) Briefly discuss the various methods of power factor improvements.
b) Explain the different types of tariffs.
- 14 a) Draw the typical layout of a gas turbine power plant and explain the main components.
b) Draw the typical diagram of pressurized water reactor and explain along with its advantages and disadvantages.
- 15 a) Show that the insulation resistance of a cable is inversely proportional to its length.
b) What are the methods of equalizing the potential distribution over a string of insulators.
- 16 a) What is the need of grading of cables? Explain capacitance grading.
b) What are the factors governing the capacitance of a transmission line? Derive an expression for the capacitance of an unsymmetrical transposed 3-phase transmission line.
- 17 Derive expression for three phase unsymmetrical spaced transmission line inductance.

FACULTY OF ENGINEERING

B. E. IV– Semester (CBCS) (Inst.) (Backlog) Examination, March/April 2021

Subject: Transducer Engineering

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

1. Define transducer.
2. Classify transducers based on their transduction method.
3. Define repeatability and reliability.
4. List any four applications of capacitive transducer.
5. A copper resistor at 20°C is used to indicate the temperature of bearings of a machine. What resistance should not be exceeded if the maximum bearing is not to exceed 150°C? The resistance temperature co-efficient of copper is 0.00392/°C at 20°C.
6. Define proximity transducer.
7. Define thermistor.
8. Enlist the requirements of transducer.
9. Write the principle of thermal conductivity gauge.
10. Define bellows.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

11. Derive the frequency response for a first order system with
a) Unit step input. b) Unit ramp input.
12. a) Explain flat grid type and woven type strain gauges.
b) A strain gauge is bonded to a beam of 0.1m long and cross sectional area of 4 cm². Young's modulus for steel is 207GN/m². The strain gauge has an unstrained resistance of 240Ω and gauge factor 2.2. When a load is applied. The resistance of gauge changes by 0.013Ω . Calculate the change in length of the steel beam and the amount of force applied to it.
13. a) Derive output voltage equation of ballast circuit used to measure strain.
b) Write the desirable characteristics of strain gauge.
14. a) Explain LVDT type transducer for measurement of pressure.
b) Explain thermal conductivity gauge.
15. a) Explain radiation pyrometer.
b) Explain liquid in glass thermometer.
16. a) Explain in detail RTD.
b) Explain the technique of temperature compensation in strain gauge circuits.
17. Write short note on
a) RVDT
b) Installation techniques of strain gauge.

FACULTY OF ENGINEERING**B.E IV-Semester (CBCS) (Mech) (Backlog) Examination, March /April 2021****Subject: Applied Thermodynamics****Time : 2 Hours****Max. Marks: 70****Note: Missing data, if any may be suitably assumed.****PART – A****Note: Answer any Five Questions****(5x2 = 10Marks)**

1. Distinguish. between "intercooling" and "aftercooling" as referred to a reciprocating air compressor.
2. Plot on TS coordinates, ideal cycle of a two stage reciprocating air compressor with intercooler and aftercooler.
3. How is scavenging period determined from valve timing diagram?
4. Define (i) Mechanical Efficiency and (ii) Brake Thermal Efficiency of an Internal Combustion Engine.
5. How Auto-ignition occurs in S.I. engines?
6. Mention at least three factors that help in mitigating the knocking tendency in a spark ignition (SI) engine.
7. Write any two mountings and two accessories in steam boilers.
8. Give any two differences between jet and surface condensers.
9. Draw the Rankine cycle on T-S diagram.
10. Define nozzle efficiency. Give its significance.

PART – B**Note: Answer any Four Questions****(4x15 = 60Marks)**

11. A single -acting, single-stage, reciprocating air compressor has a bore of 200mm and a stroke of 300 mm. It runs at a speed of 500 Rpm, while the air is compressed in accordance with the law $PV^{1.3} = \text{constant}$, from an initial pressure of 0.91 bar (abs) and the delivery pressure is 5.3955 bar (abs). The initial temperature is 20°C. Calculate (i) The air delivery temperature (ii) The amount of air delivered, and (iii) The power need to be expended in driving the compressor.
- 12.a) A 2-stroke diesel engine has a bore of 110 mm and a stroke of 150 mm. The engine runs at a mean piston speed of 5 m/s. It develops a torque of 56.3 N-m. The mechanical efficiency of the engine is 80% and the indicated thermal efficiency is 40%. Assuming a calorific value of 44800 kJ/kg for the fuel, calculate (i) IP, (ii) IMEP, and (iii) BSFC.
- b) Differentiate two stroke engines from four stroke engines.

13. a) Describe the combustion process in CI engine and how detonation occurs in it.
b) Write importance of compression swirl in C.I. engines.
14. With the neat sketch, explain the principle of working of a Babcock and Wilcox water-tube steam boiler. How does it differ from a Cochran steam boiler?
15. A steam power plant operates on an ideal Rankine cycle between a boiler pressure of 40 bar, 300°C and a condenser pressure of 0.035 bar. Calculate cycle efficiency, Work ratio, and specific steam consumption for i) Ideal Rankine cycle ii) Rankine cycle when expansion process has an isentropic efficiency of 80%.
16. a) Write short notes on Exhaust gas Emissions in C.I. engine.
b) Classification of Boilers.
17. Write short notes on
a) MPFI.
b) Applications of compressed air
c) Explain the mist lubrication in few sentences.

FACULTY OF ENGINEERING**B.E. (Prod)(CBCS) IV – Semester (Backlog) Examination, March/April 2021****Subject: Applied Thermodynamics and Heat Transfer****Time : 2 Hours****Max. Marks: 70****Note: Missing data, if any may be suitably assumed.****PART – A****Note: Answer any Five Questions****(5x2 = 10Marks)**

1. Explain the applications of compressed air.
2. Write down the expression for calculating the work done in multistage compression?
3. Explain heat balance sheet.
4. Define volumetric efficiency and indicated thermal efficiency.
5. What do you mean by detonation? Explain its effect on engine.
6. Differentiate between SI and CI engines.
7. Differentiate between three modes of heat transfer.
8. Deduce expression for ID steady state conduction through spheres.
9. Explain Weins displacement law.
10. Define emissivity. Explain?

PART – B**Note: Answer any Four Questions****(4x15 = 60Marks)**

11. A single stage single acting reciprocating air compressor is required to handle 50 cum of free air delivery per hour measured at 1 bar pressure. The delivery pressure is 6.5 bar and the speed is 500 R.p.m. Assuming a volumetric efficiency of 75%; an isothermal efficiency of 70% and a mechanical efficiency of 90%; Calculate the indicated mean effective pressure and the power required to drive the compressor
12. (a) Enumerate the differences between 2-stroke and 4-stroke engines.
(b) Mention different types of cooling systems typically used for IC engines. Explain any one of them clearly.
13. Mention the circumstances under which combustion process in a C.I. engine turns "Uncontrolled". Define "Cenat Number" and give its significance.
14. (a) Explain the concept of critical radius of insulation and derive an expression for it.
(b) Explain the effect of variable thermal conductivity in ID steady state conduction of plates.
15. Air having $C_p=11.005$ KJ/Kg K is used to cool water in a parallel flow heat exchanger. Air enters at 20°C with a flow rate of 3 Kg/s and water enters at 90°C at the rate of 1Kg/s. Determine the heat transfer rate and outlet temperatures of hot water and cold air. Assume overall heat transfer coefficient $300\text{W/m}^2\text{K}$ and surface area 10m^2 , (10) (5) (5).
16. A 4-cylinder, four stroke diesel engine runs at 1000 R.p.m. The bore and stroke of each cylinder are 100 mm and 160 mm respectively. The cut off is 6.62% of the stroke. Assuming that the initial condition of air inside the cylinder is 1 bar and 20°C , mechanical efficiency of 75%; Calculate the air-stand efficiency and brake power developed by the engine. Also, calculate the brake specific fuel consumption if the air/fuel ratio is 20:1.

Take R for air as 0.287 kJ/Kg K and clearance volume as 0.000084 m³.

17. (a) Explain the Buckingham π theorem and deduce forced convection expression.
(b) Compare merits and demerits of air and water cooling systems.

FACULTY OF ENGINEERING

B.E. IV - Semester (CBCS) (A.E.) (Backlog) Examination, March /April 2021

Subject : Metallurgy and Material Testing

Time : 2 Hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Note: Answer any Five Questions

(5x2 = 10Marks)

1. What is Critical Resolved Shear Stress?
2. Write the characteristics of ductile fracture.
3. Differentiate creep curve with stress rupture curve.
4. Draw the structure of a fatigue fracture surface and mention the fracture zones.
5. Explain the allotropy of Iron with the help of cooling curve.
6. What are the different types of Cast Irons?
7. How Nitriding is different from carborizing?
8. What is quenching? List the various types of quenching media used in hardening.
9. Explain the principle of liquid penetrant Test.
10. Write the applications of composites in automobiles.

PART – B

Note: Answer any Four Questions

(4x15 = 60Marks)

- 11 a) Discuss in detail the variation in properties and structure of material when a cold worked material is heated to successively high temperature.
b) Explain the Griffith theory of Brittle fracture.
- 12 a) Explain the three stages of creep with the help of a neat diagram.
b) Briefly discuss the application of diffusion in mechanical engineering.
- 13 a) Explain the construction of phase diagram of lead (Pb) and Tin (Sn) alloy system with a neat sketch.
b) Explain the invariant reactions that occur on Iron –Iron carbide phase diagram.
- 14 a) How Annealing is different from Normalizing? Explain.
b) Differentiate between Austempering and Martempering.
- 15 a) Explain with suitable sketch about the working principle of Magnetic Particle Test.
b) List out different methods of testing hardness. Explain Rockwell hardness testing.
- 16 a) Write the composition, properties and applications of ductile cast iron.
b) What is cumulative fatigue? How do you estimate the fatigue damage in metals?
17. Write short notes on:
 - a) Bauchinger's Effect.
 - b) Flame Hardening.
 - c.) Radiographic Testing.

FACULTY OF ENGINEERING**BE (CSE) IV Semester (CBCS) (Backlog) Examination, March/April 2021****Subject: OOP Using Java****Time : 2 Hours****Max. Marks: 70****Note: Missing data, if any may be suitably assumed.****PART – A****Answer any Five Questions****(5x2 = 10 Marks)**

- 1 How many static blocks a class can contain? Using an example explain the purpose of a static block.
- 2 What is a package? Write the syntax for creating a hierarchy of packages. Also give an example.
- 3 What is the normal priority of a thread and how the priority of a thread can be changed?
- 4 Differentiate between String and StringBuffer class.
- 5 Draw the hierarchy of Collection framework interfaces.
- 6 Explain the use of Timer class.
- 7 List the different AWT controls.
- 8 Explain how to create a password field in Java.
- 9 What is the use of Filename Filter?
- 10 What is significance of Object class in Java? List the methods of Object class that can be overridden.

PART – B**Note: Answer any Four Questions****(4x15 = 60Marks)**

- 11 a) What is dynamic method dispatch? Give an example.
b) What is an interface? Write a Java program to illustrate the use of an interface.
- 12 a) What is exception handling? Explain how to create user-defined exception classes in java with the help of a suitable example.
b) What is synchronization? Explain the need for synchronization with an example.
- 13 a) Explain the different iterators used for accessing the List elements with example.
b) Explain about Map classes.
- 14 a) What is event delegation model? Explain with suitable example.
b) Write a java program for keyboard event handling.
- 15 Write a program to demonstrate the concept of serialization.
- 16 a) Write a program to read the 'n' integer values from console and display their sum.
b) What is a layout manager? Explain any two layout managers.
17. Write short notes on any **TWO** of the following
 - a) Abstract class
 - b) Calender
 - c) HttpURL Connection

FACULTY OF ENGINEERING

BE (I.T.) IV Semester (CBCS) (Backlog) Examination, March/April 2021

Subject: OOP Using JAVA

Time : 2 Hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any Five Questions

(5x2 = 10 Marks)

1. Explain about Garbage collection?
2. Explain about jvm ,jre, jdk?
3. Explain about static and final keywords?
4. What is an abstract class? Give an example?
5. What is an Exception? Draw the hierarchy of Exception?
6. Write definition of chained Exception with example?
7. What is the difference between capacity and size of a vector class?
8. What is the purpose of transient modifier?
9. Write the difference between application and applet?
10. Explain about Nested panels?

PART – B

Answer any Four Questions

(4x15 = 60Marks)

11. (a) Explain in detail the concept of object oriented programming, with simple examples?
(b) What does this () refer to when used as a method? How does it differ from this used as an object?
12. (a) Explain about polymorphism and dynamic dispatch method?
(b) Explain the procedure of importing packages with example?
13. (a) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication?
(b) Explain about finally keyword?
14. (a) What are different ways to iterate over a list?
(b) Write a JAVA program to find the factorial of a given number.
15. (a) What is Character Stream in Java? Explain any three Character Streams with examples?
(b) Write a program for serialization concept?
16. (a) Explain AWT Component classes with suitable components?
(b) What is event handling? Explain event source classes and event Listener Interfaces?
17. Write short notes on the following:
 - (a) Thread groups
 - (b) Random Access Interface
 - (c) String Tokenizer

FACULTY OF ENGINEERING
B.E. IV-Semester (Civil) (AICTE)(Backlog) Examination, March/April 2021

Subject : Mathematics - III (PDE, P & S)

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Form the partial differential equation by eliminating the arbitrary

$$z = x^2f(y) + y^2g(x)$$

- 2 Solve $z = p^2 + q^2$

- 3 Using method of separation of variables, solve

$$3 \frac{\partial u}{\partial x} + 2 \frac{\partial u}{\partial y} = 0, u(x,0) = 4e^{-x}.$$

- 4 Define vibration of a stretched string of a wave equation and also define Laplace's equation.

- 5 Define Poisson distribution and hence find its mean.

- 6 The continuous random variable X is uniformly distributed with mean 1 and variance 3. Find $P(X < 0)$.

- 7 Calculate the coefficient of correlation between X and Y for the following data:

X	1	3	4	5	7	8	10
Y	2	6	8	10	14	16	20

- 8 Prove that correlation coefficient is the geometric mean between the regression coefficient.

- 9 Write the test of significance of the difference between the means of two small random samples drawn from the same normal population.

- 10 Write the conditions of applicability of χ^2 -test.

PART – B

Answer any four questions.

(4x15 =60 Marks)

- 11 (a) Solve $2xz - px^2 - 2qxy + pq = 0$.

(b) Solve $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$

- 12 A tightly stretched string with fixed end points $x = 0$ and $x = \ell$ is initially at rest in its equilibrium position. If it is vibrating by giving to each of its points a velocity $\lambda x(\ell - x)$, find the displacement of the string at any distance x from one end at any time 't'.

..2..

- 13 (a) In a distribution which is exactly normal, 12% of the items are under 30 and 85% are under 60. Find the mean and standard deviation of the distribution.
 (b) Find moment generating function, mean and variance of uniform distribution.

- 14 (a) Fit a second degree parabola to the following data:

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

- (b) In a random sample of 200 people in a city, 108 like to purchase imported watches and the remaining like to purchase local watches. Can we conclude that both the imported and local watches are popular in the city? (Use 2% level of significance).
- 15 (a) Two random samples of sizes 9 and 7 gave the sum of squares of deviations from their respective means as 175 and 95 respectively. Can they be regarded as drawn from normal populations with the same variance? [$F_{0.05}(8, 6) = 4.15$].
 (b) Fit a Poisson distribution for the following data and test the goodness of fit at 5% level of significance ($\chi^2_{3}(0.05) = 7.815$)

x	0	1	2	3	4	5
$f(x)$	110	170	130	60	23	7

- 16 (a) The two regression equations of the variables x and y are :

$$x = 19.13 - 0.87y \text{ and}$$

$$y = 11.64 - 0.05x$$

find \bar{x}, \bar{y}, r_{xy}

- (b) Find moment generating function of normal distribution.

- 17 Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$

Subject to the conditions :

$$u(0, y) = u(\ell, y) = u(x, 0) = 0$$

$$\text{and } u(x, a) = \sin\left(\frac{n\pi x}{\ell}\right)$$

FACULTY OF ENGINEERING**B.E. IV-Semester (EE/Inst./CSE) (AICTE) (Backlog) Examination, March/April 2021****Subject : Mathematics – III (P & S)****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

- 1 From a pack of well shuffled cards, one card is drawn. Find the probability that this card is either a king or an ace.
- 2 Check $f(x) = \begin{cases} xe^{-x^2/2}, & x > 0 \\ 0, & x \leq 0 \end{cases}$ is a probability density function.
- 3 Define skewness and kurtosis.
- 4 Find the variance of Binomial distribution.
- 5 The continuous random variables is uniformly with mean 1 and variance 3. Find $p(x < 0)$.
- 6 Find the variance of normal distribution.
- 7 List the properties of correction coefficient.
- 8 Write the normal equations for fitting the given data as straight line and parabola.
- 9 Write the test of significance of the difference between the means of two small random samples drawn from the same normal population.
- 10 Write the test for ratio of variances.

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

- 11 (a) A problem in a question paper is given to 3 students in a class to be solved. The probabilities of their solving the problem are 0.5, 0.7 and 0.8 respectively. Find the probability that the problems will be solved.
(b) A bag contains 5 white and 8 red balls. Two drawing of 3 balls are made such that the balls are not replaced before the second trial. Find the probability that the first drawing ball 3 white and the second 3 red balls in each case.
- 12 (a) An irregular six faced dice is thrown 12 times. The expectation that it will give six even numbers is twice the expectation that it will give 5 even numbers. If 1000 sets, each exactly 12 trials are made, how many sets are expected not to give any even number?
(b) In a certain factory manufacturing razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are placed in packets, each containing 10 blades. Using the Poisson distribution, calculate the approximate number of packets containing not more than 2 defective blades in a consignment of 10,000 packets.
- 13 (a) In a distribution which is exactly normal, 12% of the items are under 30 and 85% are under 60. Find the mean and standard deviation of the distribution.
(b) Let X_1 and X_2 be two independent uniformly distributed variables in $[0, 1]$. Then find the distribution of $X_1 + X_2$

..2..

14 (a) Find the correlation coefficient between x and y from the given data :

x	78	89	97	69	59	79	68	57
y	125	137	156	112	107	138	123	108

(b) Fit a parabola $y = a + bx + cx^2$ to the following data:

x	2	4	6	8	10
y	3.07	12.85	31.47	57.38	91.29

15 (a) A random sample of 17 value from a normal population has a mean of 105 cm and the sum of squares of deviations from this mean is 1225 sq.cm. Is the assumption of 110 cm for the normal population reasonable? Test under 5% and 1% level of significance.

(b) Two random samples of sizes 9 and 7 gave the sum of squares of deviations from their respective means as 175 and 95 respectively. Can they be regarded as drawn from normal populations with same variance.

16 (a) Find the best possible curve of the form $y = a + bx$, using Method of least squares for the data.

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

(b) Two random variables have the regression lines with equations $3x + 2y = 26$ and $6x + y = 31$. Find the mean values and the correlation coefficient between x and y .

17 (a) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05.

No. of defects	0	1	2	3	4
No. of units	214	92	20	3	1

(b) The number of students in a class is 100. The average marks scored by 64 boys is 66 with standard deviation of 10 while the average marks scored by 36 girls is 70 with standard deviation of 8. Test of 1% level of significance whether the girls performed better than boys.

FACULTY OF ENGINEERING

BE IV-Semester (ECE/M/P/AE/IT) (AICTE) (Backlog) Examination, March / April 2021

Subject: Biology for Engineers

Time: 2 Hours

Max .Marks: 70

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any five questions.

(5x2=10 Marks)

- 1 Differentiate prokaryotic and eukaryotic cell structure.
- 2 Write the functions of fat soluble vitamins.
- 3 Give the methods of control of microbes.
- 4 Explain the anatomy of excretory system in any vertebrate.
- 5 Differentiate mitosis and meiosis.
- 6 Describe an experiment to show that DNA is the genetic material.
- 7 What is hepatitis? How it is caused?
- 8 What is antigen? How does it induce immune response?
- 9 What are stem cells? Give applications of stem cells.
- 10 Define bioremediation. Give examples of microorganisms used in bioremediation.

PART – B

Answer any four questions.

(4x15=60 Marks)

- 11 Give a detailed account on classification and functions of lipids.
- 12 Describe the process of photosynthesis.
- 13 Explain with examples laws of inheritance.
- 14 Discuss the causes, symptoms, diagnosis, treatment and prevention of AIDS.
- 15 What are biochips? Explain the principle and applications of biochips.
- 16 Discuss the methodology of cloning. Give applications of cloning.
- 17 Write an account on mechanism of enzyme action.