FACULTY OF ENGINEERING
B.E. (AICTE) (Civil) IV – Semester (Main) Examination, December 2020
Subject : Fluid Mechanics

Time: 2 Hours   **Max. Marks: 70**

Note: Missing data if, any can be assumed suitably
PART- A
Answer any five questions.   **(5 x 2 = 10 Marks)**

1. Define specific mass and specific weight
2. Define the term metacentre.
3. Distinguish between rotational flow and irrotational flow
4. Distinguish between body forces and surface forces.
5. State the principle involved in pitot tube
6. What do you understand by cavitation
7. Differentiate between streak line and path line
8. Differentiate between free vertex motion and forced vertex motion
9. List out important applications of Bernoulli's equation
10. Write equation for discharge in rectangular notch with end contractions and state the terms used.

PART – B
Answer any four questions.   **(4 x 15 = 60 Marks)**

11 a) What is vapour pressure explain the significance of vapour pressure in engineering applications.
   b) A flat plate of area 1.3 x 10^6 mm^2 is pulled with a speed of 0.3 m/s relative to another plate located at a distance of 0.12 mm form it. Find the force and power required to maintain this speed. The fluid has Viscosity of 1 poise.

12 a) Derive Continuity equation in 2 - dimension. State all the assumptions and limitations.
   b) An open circular tank of 20cm diameter and 80cm long contains water upto a height of 40 cm. The tank is rotated about its vertical axis at 200 rpm. Find the depth of parabola formed at the free surface of water

13 a) Define pascals law and prove the statement
   b) Determine the total pressure on a circular plate or diameter 1.5m which is placed vertically in such a way that the centre of plate is 3M below the free surface of water. Also calculate the centre of pressure

14 a) Derive Eulers equation of ncotion in 3-dimensions
   b) A 45° reducing bend is connected in a pipe line. The diameter at inlet and out of the bend are 60cm and 30cm respectively. Calculate the forces exerted by water on the bend if in tensity of pressure at inlet to bend is 9 N/cm^2 and rate of flow is 500 lit/sec.

15 a) Derive an expression for discharge flowing through a Ventorimeter
   b) Find the velocity of flow of on oil through the pipe when the difference of mercury level in a differential U-tube manometer Connected to 2 toppings of Pitot tube is ½ cm. take C_v a 0.98 and specific gravity of oil as 0.85.

16 a) Classify different types of notches with the aid of sketches and explain briefly
   b) Differentiate between rotational flow and irrotational flow with relevant expressions

17. Write short notes on two of the following
    a) Compressibility
    b) Laminar and turbulent flow
    c) Elbow meter.

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FACULTY OF ENGINEERING

B.E. (EEE / Inst.) (AICTE) IV – Semester (Main) Examination, December 2020

Subject: Digital Electronics and Logic Design

Time: 2 Hours   **Max.Marks: 70**

Note: Missing data if, any can be assumed suitably

PART- A

Answer any five questions.   **(5 x 2 = 10 Marks)**

1. Write the truth table of universal gates.
2. What is noise margin, propagation delay?
3. Differentiate between encoder and decoder.
4. Define half subtractor using NOR gate.
5. Differentiate Combinational and Sequential Circuits.
6. What is debounce switch?
7. Write Excitation table of D Flip Flop and T flip flop.
8. Define Accuracy and Settling Time.
9. Write Specifications of ADC and define input impedance.
10. Define T_{CO} and T_{CX}.

PART – B

Answer any four questions.   **(4 x 15 = 60 Marks)**

11. a) Differentiate between synchronous and asynchronous counter.
    b) Convert SR to JK flip flop.

12. Design BCD asynchronous counter and draw timing diagram.

13. Discuss about basic latch circuit.

14. Design 2 bit comparator and draw logic diagram.

15. a) Implement the given function using F(ABCD) = Σ(0, 1, 2, 4, 7, 8, 9, 11, 14, 15) using 8x1 mux.
    b) Construct 4x16 decoder using 3x4 decoder.

16. Explain Dual Slope ADC.

17. Explain operation of CAM in detail.

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FACULTY OF ENGINEERING
B.E. (ECE) (AICTE) IV-Semester (Main) Examination, December 2020
Subject : Electromagnetic Theory and Transmission Lines

Time: 2Hours   Max. Marks:70

Note: Missing data if, any can be assumed suitably

PART- A
Answer any five questions.   **(5 x 2 = 10 Marks)**

1. Express the point P (1, 3, 5) in cylindrical coordinates
2. Classify the charge configurations and write their charge densities
3. Give the statement of Biot - Savart's law
4. Write the relations between magneto static fields, scalar and vector magnetic potentials.
5. List the time varying Maxwell's equations for dielectric medium.
6. Define Brewster and Critical angles.
7. Draw the T-type equivalent circuit model of two wire transmission line.
8. Write the need for loading of a transmission line.
9. A 50Ω line is terminated by 50Ω. Find reflection coefficient and standing wave ratio. What do you understand from the obtained value of reflection coefficient?

10. Give the applications of smith chart

PART – B
Answer any four questions.   **(4 x 15 = 60 Marks)**

11.a) Deduce the Maxwell's equations for electrostatic fields.
   b) If V = x – y + xy + 2z V, find E at (1, 2, 3) and the electrostatic energy stored in a cube of side 2 m centered at the origin.

12 a) Derive $\nabla \times \overline{H} = and \ \nabla \cdot \overline{B} = 0$.
   b) Region 1, for which $\mu_{r1} = 3$, is defined by x < 0 and region 2, x > 0 has $\mu_{r2} = 5$ Given $\overline{H}_1 = 4\hat{a}_x + 3\hat{a}_y - 6\hat{a}_z$ A/m. Determine H2 for x>0 if the boundary is free of current.

13 a) Deduce EM wave equations for free space.
   b) A plane wave in a nonmagnetic medium has $\overline{E} = 10 \cos(108 \ t - 2z)\hat{a}_y V / m$. Find the direction of wave propagation, $\beta, \lambda, v \ and \ \overline{H}$.

14 a) What is the concept distortion less transmission line, derive distortion less condition and write expressions for Z_o and propagation constant.
   b) A line has characteristic impedance of 70Ω, zero conductivity and phase constant of 3 rad / m at 100 MHz. Calculate the inductance per meter and the capacitance per meter of the line.

15 a) Justify the statement "Transmission lines acts as circuit elements" with suitable example.

b) A line with $\sigma = 0$ in air has a characteristic impedance of 300Ω and is terminated by an unknown impedance. When the frequency is 200 MHz, SWR is 4.48 and first voltage minima is situated at 6cm from the load, determine the complex reflection coefficient and terminating impedance of the line.

16 a) If $\overline{D} = (2y^2 + z)\hat{a}_x + 4xy\,\hat{a}_y + x\hat{a}_z\,C/m^2$, find the volume charge density at (-1, 0, 3) and the flux through the cube defined by $0 \le x \le 1, 0 \le y \le 1, 0 \le z \le 1$.

b) A thin ring of radius 5 cm is placed on XY-plane and its centre is at origin. If the ring carries 50 mA along aφ, find **H** at (0, 0, -1 cm) and (0, 0, 10cm)

17 a) Write short notes on normal incidence on dielectric medium
   b) Compare distortion less and UHF lines

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FACULTY OF ENGINEERING
B.E IV-Semester (AICTE) (Mech) (Main) Examination, December 2020
Subject: Applied Thermodynamics

Time: 2 Hours   **Max. Marks: 70**

Note: Missing data if, any can be assumed suitably
PART- A
Answer any five questions.   **(5 x 2 = 10 Marks)**

1. Define and classify Compressors.
2. Explain about perfect intercooling in Reciprocating air compressors?
3. Write the formula for Indicated power of an Ic engine and explain each term in it.
4. Discuss the significance of the Heat Balance Sheet in IC engines
5. Explain the Ignition delay period in compustion is CI engines
6. Draw the theoretical p-θ (Pressure Vs Crank angle) diagram for CI engines.
7. Explain briefly the importance of air preheater and economizer in a steam boiler.
8. Define condenser and explain any one type of jet condenser?
9. Explain the Rankine cycle with Reheating.
10. Discuss the concept of critical pressure ratio in steam nozzles

PART – B
Answer any four questions.   **(4 x 15 = 60 Marks)**

11.a) Define volumetric efficiency and obtain an expression for it in case of a reciprocating air compressor.
   b) A single-acting single-cylinder reciprocating compressor has a cylinder diameter of 200 mm and a stroke of 300mm air enters the cylinder at 1 bar and 27^0 C, it is then compressed polytropically to 8 bar according to the law $PV^{1.3} = C$. If speed of compressor is 250 Rpm calculate the mass of air compressed per min and power required in kw to drive the compressor.

12. The following observations were made during a trial of a single-cylinder four-stroke cycle gas engine having a cylinder diameter of 18cm and a stroke 24cm. Duration of trial = 30 min, Total number of revolutions = 9000, Total number of explosions =4450, Mean effective pressure = 5bar, Netload on brake wheel = 40kg, Effective diameter of brake wheel = 1m, Total gas used at NTP = $2.4m^3$, Calorific value of gas at NTP = 19 MJ/m^3, Total air used = 36m^3 ; Pressure of air = 720 mm of Hg, Temperature of air = 17^0C, Density of air at NTP = 1.29 kg/m^3, Temperature of exhaust gases = 350^0C, Room Temperature = 17^0C, Specific heat of exhaust gases = 1 KJ/kg^{0}c, cooling water circulated = 80kg, Rise in temperature of cooling water = 30^0c. Draw a heat balance sheet and estimate mechanical and indicated thermal efficiencies of the engine (R = 287J/kg k).

13.a) Explain in detail flame front propagation in S.I. engine? Discuss the factors influencing the flame speed.
   b) Discuss the abnormal combustion in S.I. engine.

14.a) Sketch and explain Babcock and Wilcox boiler.
   b) Differentiate between jet and surface condensers.

15. a) Derive an expression for the condition for maximum discharge through the nozzle.
    b) In a convergent-divergent nozzle, the steam enters at 15 bar, 300^0C and leaves it at a pressure of 2 bar. The inlet velocity to the nozzle is 150m/sec. Find the required throat and exit areas for the mass flow rate of 1kg/sec. Assume, nozzle efficiency to be 90%. Assume Cp = 2.4 KJ/kg k.

16. a) Give the advantages of multistage compression.
    b) Explain the splash lubrication system.

17. a) Sketch any two types of combustion chambers for CI engine.
    b) Sketch and explain lancashire boiler.
    c) Explain the phenomenon of flow of steam through convergent- divergent nozzle.

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FACULTY OF ENGINEERING

BE IV-Semester (AICTE) (PROD) (Main) Examination, December 2020

Subject : Applied Thermodynamics and Heat Transfer

Time: 2 Hours   Max. Marks: 70

Note: Missing data if, any can be assumed suitably

PART- A

Answer any five questions.   **(5 x 2 = 10 Marks)**

1. What is the significance of volumetric efficiency of a reciprocating air compressor? BT3,CO1

2. Draw indicator diagram for a two stage reciprocating air compressor with intercooling? BT2,CO1

3. Give the classification of IC engines?   BT1,CO2

4. Why diesel engines are used generally for heavy duty applications?   BT4,CO2

5. Derive an expression for thermal resistance of slab from Fourier's law of conduction? BT2,CO4

6. Explain mechanism of conduction heat transfer ?   BT2,CO5

7. Write Newton law of convection ? Define convective heat transfer coefficient? BT1,CO5

8. Write Planck's law of radiation?   BT1 CO4

9. Sketch a simple carburettor and label the parts?   BT2 ,CO3

10. Mention some applications of heat exchangers?   BT3,CO6

PART – B

Answer any four questions.   **(4 x 15 = 60 Marks)**

11. Derive an expression for work done per cycle for a single stage reciprocating air compressor , with isothermal compression. Assume zero clearance.   BT2,CO1

12. A single cylinder four stroke diesel engine has 65mm bore and 100mm stroke. The fuel consumption is 1.5 kg/hr. The engine runs at a speed of 800rpm. The calorific value of fuel is 44000kj/kg. The mean effective pressure is 52 bar. Determine indicated thermal efficiency , brake thermal efficiency and mechanical efficiency? frictional loss in the engine is 0.2kw. BT3,CO2

13. With neat sketches, explain working of four stroke engines ? BT3,CO2

14. Discuss the need for lubrication in IC engines ? Name the parts in IC engines which   need lubrication? With neat sketch, explain wet sump lubrication system? BT2,CO3

15. What is meant by critical insulation? Derive an expression for critical radius of insulation for a cylinder ?   BT3,CO4

16. Explain Black body, white body, gray body and emissivity ?   BT1,CO5

17. Air is blowing over a hot metallic plate having size 10mx8m . The surface temperature of the plate is 170° C. Temperature of the surrounding air is 30^0 C. The convective heat transfer coefficient is 12 w/m^2 .Determine the heat loss from the plate. Also determine the convective resistance to heat transfer. BT3,CO4

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FACULTY OF ENGINEERING

B.E. (CSE) IV-Semester (AICTE) (Main) Examination, December 2020

Subject : Computer Organisation

Time : 2 hours   **Max. Marks :70**

Note: Missing data if, any can be assumed suitably
PART- A
Answer any five questions.   (5 x 2 = 10 Marks)

1   Give the significance of the following Memory operations.

    i)$R2 \leftarrow M[AR]$

    ii)$M[AR] \leftarrow DR$

2   The memory unit of a computer has 256K words of 32 bits each. The computer has an instruction format with four fields: an operation code field, a mode field to specify one of seven addressing modes, a register address field to specify one of 60 processor registers, and a memory address. Specify the instruction format and the number of bits in each field if the instruction is in one memory word.

3   Differentiate between Isolated I/O and Memory-Mapped I/O.2

4   What is strobe control? Explain.

5   Differentiate between write back and write through mechanism of writing data into cache memory.2

6   How many lines of address bus must be used to access 2048 bytes of memory?

7   Justify How the 8086 Microprocessor speed is high when it is operating in Maximum mode than that of minimum mode.2

8   What are the addressing modes of 8086?

9   What is pipelining? Give an example.2

10   Identify the syntax errors in the following instructions.2

    i)   MOV BH, AX   ii) MOV 7632H, CX

    iii) IN BL,04H   iv) ADD AL,2073H

PART – B
Answer any four questions.   (4 x 15 = 60 Marks)

11 a)   Evaluate the arithmetic expression using memory stack.

     X=L*M+L*(M*O+N*P)

   b)   An instruction is stored at location 400 with its address field at location 401. The address field has the value 500. A processor register R1 contains the number 200. Evaluate the effective address if the addressing modes of the instruction is   **i)** Direct **ii)** Immediate **iii)** Relative **iv)** Register indirect

12 a)   Design a block diagram to transfer information between I/O and Memory unit without the intervention of CPU using DM.

   b)   How many characters per second can be transmitted over a 2400-baud line in each of the following modes? (Assume a character code of eight bits.)

    i)   Synchronous serial transmission.

    ii)   Asynchronous serial transmission with two stop bits.

    iii)   Asynchronous serial transmission with one stop bit.

13 a) Explain about RAM and ROM chips.

b) What is the significance of Associative Memory? Design an associative memory with 1000 words and 16 bits per word. Determine the size of the argument register and Key register. What are the contents of Key register if only first 5 bits are required to be searched in the associative memory? Explain the design of match logic required to search for the contents of argument register with the help of a diagram.

14 a) Explain the addressing modes of 8086 microprocessor.
b) What is a PSW? What flags will affect by the following mnemonics: Let AX=1010h, CX = 1111h and CY = 1.
i. RCL AX, 01h
ii. XOR CX, CX
iii. ADD AX, CX

15 a) What is a Procedure? Write a program to find the sum of two 8-bit numbers using Procedures.
b) Let the contents of the different registers in the 8086 be as follows:
DS = 1000H, SS = 2000H, ES=3000H,
BX = 4000H, SI=5000H, DI=6000H and BP=7000H.
find the memory addresses from where the 8086
Accesses the data while executing the following instructions:
i)   MOV   AX,[BX]
ii)   MOV   AX,[BX+DI]
iii)   MOV   BX,[BX+DI+5]
iv)   MOV   AH,[BX+10H]
v)   MOV   BX,[SI-5]

16 a) Explain three address, two address, one address and zero address instructions. Give example for each.
b) What are the different modes of IO Transfer? Explain.

17 a) What is the significance of virtual memory? Explain.
b) Write an assembly language program to find the smallest word in an array of 100 words stored sequentially in the memory, starting at the offset 1000H in the segment address 5000H. store the result at the offset 2000H in the same segment.

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FACULTY OF ENGINEERING

B.E. (I.T) (AICTE) IV – Semester (Main) Examination, December 2020

Subject: Database Systems

Time: 2 Hours **Max.Marks: 70**

Note: Missing data if, any can be assumed suitably

PART- A

Answer any five questions. **(5 x 2 = 10 Marks)**

1   Identify various database users.
2   Define database schema, instance and database state.
3   Define weak and strong entity sets.
4   Discuss Armstrong axiom or Armstrong inference rules.
5   What is a dense and sparse index?
6   State ACID properties.
7   What is a view and how it is advantageous over a table?
8   What are different types of relational calculus. Give example?
9   Define Nested queries. Give example.
10 What is a data warehouse?

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11 a) Explain three schema architecture.
    b) Explain advantages of using DBMS approach.

12 a) Explain 1NF, 2NF AND 3NF using an example.
    b) Explain different types of attributes in ER model.

13 Construct a B⁺ tree for the following set of key values using proper steps. Assume n=3.
       2, 3, 5, 7, 9, 11, 17, 19, 23, 29, 31

14 a) Explain various relational algebra operations with example.
    b) Explain primary key and foreign key with examples.

15 a) Write SQL queries using the following schema:
       Emp (empno, ename, job, mgr, hiredate, salary, commission, deptno)
       Dept (deptno, dname, loc)
       i)   Display all the employees working under the managers 7566 and 7590
       ii) Display all the details of smith along with his department details
       iii) Delete all departments where employees earn between 1300 and 1500
       iv) Update commission by 5% of all those employees whose salary is >5000
       v)   Add a new column budget in the Dept table.
    b) Discuss various aggregate functions used in SQL.

16 a) Explain 2-phase locking techniques.
    b) List Codd's rules.

17 Write short notes on:
    a) State transition diagram
    b) Serializable schedule
    c) Deadlock.

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FACULTY OF ENGINEERING

B. E. IV – Semester (AICTE) (A.E) (Main) Examination, December 2020

Subject: Automotive Chassis Components

Time: 2 hours   **Max. Marks: 70**

Note: Missing data if, any can be assumed suitably
PART- A
Answer any five questions.   **(5 x 2 = 10 Marks)**

1. Sketch a ladder frame and state the functions of each member.

2. Compare integral body construction chassis with semi-integral chassis frame.

3. Sketch any two types of front axles and indicate the main components.

4. Define King pin inclination and write its importance.

5. Discuss why two universal joints and a sliding joint required for a Hotchkiss drive system.

6. List out the functional requirements of propeller shaft.

7. Discuss the need of damper in vehicles.

8. List out the parameters influencing the suspension characteristics of a vehicle.

9. Compare the advantages of servo assisted brake with other brakes.

10. Define stopping distance.

PART – B
Answer any four questions.   **(4 x 15 = 60 Marks)**

11. (a) Explain conventional and integral chassis frame with neat sketches.

    (b) Classify the chassis with reference to engine location and drive system with neat sketches.

12. (a) Explain Ackerman's steering geometry with suitable diagram.

    (b) Derive fundamental equation for correct steering.

13. (a) Explain drive system for any three wheeler vehicle with neat sketch.

    (b) Explain tractive effort and traction.

14. (a) Explain the pneumatically operated suspension system with neat sketch.

    (b) Explain the arrangement and working of anti roll bar with neat sketch.

15. (a) Explain vacuum assisted braking system with a neat sketch.

    (b) Explain parking braking system in detailed.

16. (a) Explain chassis frame alignment procedure with neat sketch.

    (b) Explain Davis steering geometry with suitable diagram.

17. (a) Explain the arrangement and working of torsion bar with neat sketch.

    (b) Explain Exhaust braking system with a neat sketch.

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