

FLUID MECHANICS**(Civil Engineering)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a. State Newton's law of viscosity; Give the classification of fluids with examples [6]
based on the above law
- b. An 80 mm diameter composite solid cylinder consists of an 80 mm diameter, 20 mm thick metallic plate having specific gravity 4.0 attached at the lower end of an 80 mm diameter wooden cylinder of specific gravity 0.8. Find the limits of the length of the wooden portions so that the composite cylinder can float in stable equilibrium in water (specific gravity 1.0) with its axis vertical. [8]

(OR)

2. a. Explain the terms total pressure and center of pressure [6]
- b. A simple U-tube manometer containing mercury is connected to a pipe in which an oil of specific gravity 0.8 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is open to atmosphere. Find the vacuum pressure in the pipe, if the difference of mercury level in the two limbs 200mm and height of oil in the left limb from the center of the pipe is 100 mm below. [8]

UNIT-II

3. a. In the vertical end of oil tank is a plane rectangular inspection door 600 mm wide and 400 mm deep which closely fits an aperture of the same size. The door can open about one vertical edge by means of two hinges, respectively 125 mm above and below the horizontal centre-line, and at the centre of the opposite vertical edge is a locking lever. Determine the forces exerted on each hinge and on the locking lever when the tank contains an oil of relative density 0.9 to a depth of 1m above the centre of the door and the air above the oil surface is at a gauge pressure of 15 kPa. [7]
- b. A triangular plate with base 2 m and height of 4 m is immersed in water and the plane of the plate makes an angle 30° with the free surface of water. The base is parallel to water surface and 2 m below the free water surface. Find out the total pressure acting on the plate and the centre of pressure from free surface of water. [7]

(OR)

4. a. Obtain the expression for total pressure and centre of pressure of a body vertically immersed in a liquid. [6]
- b. A buoy, floating in sea-water of density $1025 \text{ kg} \cdot \text{m}^{-3}$, is conical in shape with a diameter across the top of 1.2 m and a vertex angle of 60° . Its mass is 300 kg and its centre of gravity is 750 mm from the vertex. A flashing beacon is to be fitted to the top of the buoy. If this unit is of mass 55 kg what is the maximum height of its centre of gravity above the top of the buoy if the whole assembly is not be unstable? [8]

UNIT-III

5. a. Define the equation of continuity. Obtain an expression for continuity equation for a three dimensional flow [7]
- b. The following cases represent the two velocity components, determine the third component of velocity such that they satisfy the continuity equation [7]

$$u = x^2 + y^2 + z^2; v = xy^2 - yz^2 + xy$$

(OR)

6. a. Define stream function and velocity potential function; show that the equipotential lines and lines of constant stream function are orthogonal. [7]
- b. The velocity potential function Φ is given by an expression [7]

$$\Phi = - (xy^3/3) - x^2 + (x^3y/3) + y^2$$

- i. find the velocity components in x and y direction.
- ii. Show that Φ represent a possible case of flow.

UNIT-IV

7. a. Derive Euler's equation of motion for flow along a stream line. What are the assumptions involved. [6]
- b. A 45° bend a rectangular air duct of 1 m² cross sectional area is gradually reduced to 0.5 m² area. Calculate the magnitude and direction of the force required to hold the duct in position if the velocity of flow at 1 m² inlet is 10 m/s and pressure at inlet is 2.943 N/cm². Take density of air as 1.16 kg/m³. [8]

(OR)

8. a. State the momentum equation. How will you apply momentum equation for determining the force exerted by a flowing liquid on a pipe bend? [6]
- b. A water pipe changes in diameter from 400mm at section A to 800mm at section B which is 7 m above. The pressures at A and B are 100 KPa and 75 KPa respectively. The discharge is 400 litres/sec. Find the direction of flow. [8]

UNIT-V

9. a. Write Darcy's equation and explain its significance. [6]
- b. A venturimeter is used for measuring the flow of petrol in a pipe line inclined at 35 degrees to horizontal. The specific gravity of the petrol is 0.81 and throat area ratio is 4. If the difference in mercury levels in the gauges is 50mm, calculate the flow if the pipe diameter is 0.3m. Take coefficient of discharge as 0.975. [8]

(OR)

10. a. Derive an expression for discharge over a broad crested weir. [6]
- b. A pipe line 30 cm in diameter 1500 m long is used to connect two tanks and has a slope of 1 in 100. The water level in the first tank is 10 m above inlet of the pipe and water level in the second tank is 2 m above the outlet of the pipe. Considering only frictional losses, find the flow rate through the pipe. Also draw TEL and HGL lines. Take friction factor as 0.005 [8]

**ELECTRICAL MACHINES-I
(Electrical and Electronics Engineering)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Is Excitation is necessary for DC machine and mention the types of excitation in DC machines 7 M
- b) In a 120 V compound generator the resistance of armature, shunt and series winding are 0.05, 25 and 0.04 respectively. The load current is 100 A at 120 V find the induced emf and the armature current when the machine connected as (i) Long shunt (ii) short shunt how will the ampere turns of the series field can be change in (i) if a diverter of 0.1 ohm be connected in parallel with the series field wining. 7 M

(OR)

2. a) What is meant by commutation and its effects on DC machines and mention the methods to improve the commutation. 7 M
- b) A 22.38 KW, 440 V 4 pole wave wound dc shunt motor has 840 armature conductors and 140 commutator segments. Its full load efficiency is 88 % and the shunt field current is 1.8 A. If the brushes are shifted backwards through 1.5 segments from the geometrical neutral axis find the demagnetising and distorting amp turn/pole. 7 M

UNIT-II

3. a) Explain the working principle of a DC Motor and draw the torque speed characteristics of a DC Motor 7 M
- b) A 25 KW 250 V DC Shunt generator has armature and field resistances are 0.06 and 100 ohms respectively determine the total armature power developed when working as a) a generator delivering 25 KW output b) as a motor 25 KW as Input 7 M

(OR)

4. a) In what way the efficiency of Machines Effects and mention the losses describe them and mention the condition to obtain maximum efficiency for a DC Machines 7 M
- b) Explain about OCC characteristics of DC machine. 7 M

UNIT-III

5. a) Explain the speed controlling methods of DC shunt machine. 7 M
b) A 2 pole series motor runs at 707 rpm when taking 100 A at 85 V with the field coils in series the resistance of each field coil is 0.03 Ohm and that of the armature 0.04 Ohm if the field coils are connected in parallel and load torque remains constant find
i) speed ii) the additional resistance to be inserted in series with the motor to restore the speed to 707 rpm
(OR)
6. a) What is meant by starter and its importance and explain the operation 3 point starter with neat diagram. 7 M
b) Explain about procedure to conduct Swinburne's test on DC shunt machine . 7 M

UNIT-IV

7. a) Explain the construction features of a transformer and derive the EMF equation of transformer. 7 M
b) (i) A 2200 / 200 V transformer draws a no load primary current of 0.6 A and absorbs 400 W find the magnetising and iron loss currents (ii) A 2200 / 250 V transformer takes 0.5 A at a power factor of 0.3 on open circuit find the magnetising and working component of no load primary current
(OR)
8. a) From the operation of transformer draw the equivalent circuit of a transformer 7 M
b) A 50 KVA 4400/220 V transformer has $R_1 = 3.45 \Omega$, $R_2 = 0.009 \Omega$ the values of reactance are $X_1 = 5.2 \Omega$ and $X_2 = 0.015 \Omega$ calculate for the transformer
i) equivalent resistance referred to primary and secondary
ii) equivalent reactance referred to primary and secondary
iii) equivalent impedance referred to primary and secondary
iv) total copper loss

UNIT-V

9. a) In what way we can find the efficiency of a transformer and explain the test procedure to find out the losses 7 M
b) A 5 KVA 200/1000 V 50 Hz single phase transformer gave the following test results OC: 2000 V, 1.2 A, 90 W and SC: 50 V, 5 A, 110 W. Calculate the parameters of the equivalent circuit referred to LV side 7 M
(OR)
10. a) In what way the auto transformer is different from normal transformer in terms of construction, working and losses. 7 M
b) Obtain the equivalent circuit of a 200/400 V 50 Hz single phase transformer OC test : 200V, 0.7A, 70 W on LV Side and SC test : 15V, 10 A, 85 W on HV Side, calculate the secondary voltage when delivering 5 KW at 0.8 PF lagging the primary voltage being 200 V 7 M

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain gating system elements with neat sketch? **10**
b) Describe the shell moulding process to fabricate a given product with neat diagram? **4**

(OR)

2. a) Describe the construction and working principle of cupola furnace with neat diagram? **7**
b) Explain the step by step procedure to design the raiser for casting a given product? **7**

UNIT-II

3. a) Explain in detail about Oxygen-Hydrogen welding process with neat diagram? **7**
b) Explain various types of flames and its applications in oxy-acetylene gas welding process? **7**

(OR)

4. a) Briefly explain brazing, braze welding, and soldering process with applications. **6**
b) Suggest a suitable process to weld two cylindrical rods by heat produced by mechanical means without adding any filler material and explain in detail with neat sketch? **8**

UNIT-III

5. a) Explain the various types of metal working processes with neat diagram? **7**
b) Explain the cold working and hot working process in detail with neat diagram? **7**

(OR)

6. a) Describe the various types of rolling passes with neat diagram? **7**
b) Explain in detail about various rolling stand arrangements with neat diagram? **7**

UNIT-IV

7. a) Suggest a suitable process to fabricate 1 mm diameter wire from 10 mm diameter rod and explain the process with step by step procedure? **7**
b) Explain in detail about various types of major extrusion processes with neat diagram? **7**

(OR)

8. a) Explain about the press forging and upset forging process in detail with diagram **7**
b) Describe spring back effect in sheet metal forming with neat diagram and also discuss its importance? **7**

UNIT-V

9. a) Explain in detail about magnetic pulse forming with neat diagram and discuss its process parameters? **7**
b) Explain in detail about Electro hydraulic forming with neat diagram and also discuss its process parameters? **7**

(OR)

10. a) Explain about calendaring and blow moulding process in detail with neat diagram? **7**
b) Explain various processes for fabricating thermoplastic plastics with neat diagram? **7**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Regular Examinations, October, 2017

**PULSE AND DIGITAL CIRCUITS
(Electronics and Communication Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

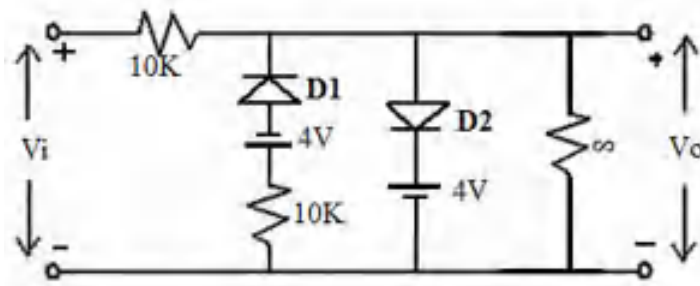
1. a. What is an attenuator? How can an uncompensated attenuator be modified as a compensated attenuator. Give the comparison between perfect compensation, under compensation and over compensation. 7M
- b. Draw the output waveform of an RC high-pass circuit with a square wave input under different time constants. Derive the expression for percentage of tilt. 7M

(OR)

2. a. An RC low-pass filter is fed with a symmetrical square wave. The peak-to-peak amplitude of the input waveform is 10 V and its average value is zero. It is given that $RC=T/2$ where T is the period of the square wave. Determine the peak-to-peak amplitude of the output waveform 7M
- b. Determine the average value of the output of a highpass RC circuit, give the reason for the result. 7M

UNIT-II

3. A voltage signal of $10 \sin \omega t$ is applied to the circuit with ideal diodes shown in Figure below. Estimate the maximum & minimum values of output waveform and maximum current through each diode. Also draw the input-output waveforms with proper explanation 7M



- b. Explain the working of a two-level diode clipper with the help of circuit diagram, waveform and transfer characteristics. 7M

(OR)

4. a. Give the circuits of different types of shunt clippers and explain their operation with the help of their transfer characteristics 7M
- b. With a neat circuit diagram and necessary waveforms, expressions explain about ringing circuit. 7M

UNIT-III

5. a. What is triggering? Explain the different types of triggering circuits. 7M
b. Explain the different switching times of a transistor. 7M
- (OR)**
6. a. The fixed biased binary uses NPN silicon transistors with $h_{fe}=20$. Assume that $V_{cc}=12V$, $V_{bb}=3V$, $R_c=1K\Omega$, $R_1=10K\Omega$, $R_2=20K\Omega$. Find the stable state currents and voltages of $V_{CE(sat)}=0$ and $V_{BE(sat)}=0$. 7M
b. What is piecewise- linear approximation? Draw the V-I characteristics of a junction diode on the basis of the above approximation. 7M

UNIT-IV

7. a. Explain with the help of a circuit how an Astable multivibrator can be modified as voltage to frequency converter 7M
b. Derive the relation between the slope, transmission and displacement errors 7M
- (OR)**
8. a. Explain the working of a simple transistor voltage sweep circuit with necessary diagrams 7M
b. Justify how a monostable multivibrator can act as a voltage to time converter. 7M

UNIT-V

9. a. What is pedestal? How it affects the output of a sampling gate? 7M
b. What are the relative advantages of diode controlled and RC controlled astable blocking oscillator. 7M
- (OR)**
10. a. Explain the working of monostable Blocking oscillator with base timing.. 8M
b. What are the drawbacks of two diode sampling gates? 6M

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AR16

CODE: 16CS2003

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, January, 2019

**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE & IT)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Prove that, for any propositions p, q, r the conditional $[(p \rightarrow q) \vee (p \rightarrow r)] \leftrightarrow (p \rightarrow (q \vee r))$ is a tautology 7M

b) Obtain the PDNF of $p \rightarrow [(p \rightarrow q) \wedge \neg(\neg q \vee \neg p)]$ 7M

(OR)

2. a) Using mathematical induction prove the following statement is true for all positive integers of N . $1^2 + 2^2 + 3^2 + \dots + n^2 = [n(n+1)(2n+1)] / 6$ for $n \geq 1$ 10M

b) Determine $P \rightarrow S$ can be derived from the following premises 4M
 $(\sim P \vee Q), (\sim Q \vee R), R \rightarrow S$

UNIT-II

3. a) Verify that $R = \{(1,1), (2,2), (3,3), (4,4), (1,2), (2,1)\}$ is an equivalence relation on the set $A = \{1, 2, 3, 4\}$. Find the corresponding partition of A 8M

b) Let f and g be functions from R to R defined by $f(x) = ax + b$ and $g(x) = 1 - x + x^2$. If $(g \circ f)(x) = 9x^2 - 9x + 3$, determine a, b . 6M

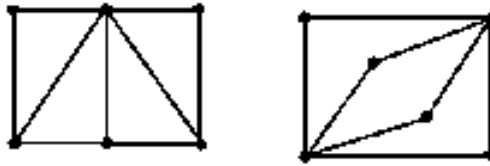
(OR)

4. a) Let $X = \{2, 3, 6, 12, 24, 36\}$ and a relation ' \leq ' be such that $x \leq y$ if x divides y . Draw the Hasse diagram of (X, \leq) . 7M

b) Let $X = \{1, 2, 3, 4\}$ and a mapping $f: X \rightarrow X$ be given by $f = \{(1,2), (2,3), (3,4), (4,1)\}$. Find the composition function f^2, f^3 , and f^4 .

UNIT-III

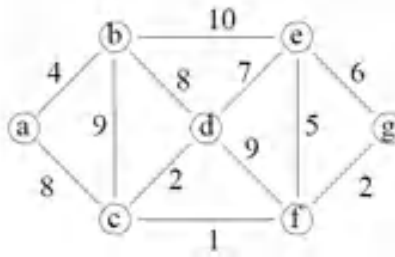
5. a) Define Euler Graph? Which of the following are Eulerian Graphs 6M



- b) Show that the complete bipartite graph $K_{3,3}$ is non-planar 8M
(OR)
6. a) How to determine adjacency matrix for a graph. Explain properties of adjacency matrix by taking suitable graph 7M
 b) Draw $K_{2,3}$ graph and find the chromatic number of $K_{2,3}$ 7M

UNIT-IV

7. a) What is a spanning tree and minimum spanning tree? 4M
 b) Write BFS algorithm and discuss with an example 10M
(OR)
8. a) Write the Prim's algorithm and find minimal spanning tree of the weighted graph shown below 10M



- b) Give the differences between Trees and Graphs 4M

UNIT-V

9. Using generating function method, solve the recurrence relation $a_{n+1} = 3a_n + (n+1), n \geq 0$ 14M
(OR)
- 10 (a) Differentiate between Homogeneous and Non-homogeneous recurrence relations with examples. 7M
 (b) Find the co-efficient of x^{20} in $(x^3 + x^4 + x^5 \dots)^5$ 7M

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