

ENVIRONMENTAL ENGINEERING-II**(Civil Engineering)****Time: 3 Hours****Max Marks: 60**

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. Explain in detail about characteristics of sewage 12
- (OR)**
2. Design a sewer to serve a population of 36,000; the daily per capita water supply allowance being 135 litres, of which 80 % finds its way into the sewer. The slope available for the sewer to be laid is 1 in 625 and the sewer should be designed to carry four times the dry weather flow when running full. What would be the velocity of the flow in the sewer when running full? 12

UNIT-II

3. Explain in detail about mechanism, types, working and construction of trickling filters. 12
- (OR)**
4. a) Design a grit chamber for the following data 6
 - i) Discharge = 8000 m³/d
 - ii) Settling velocity = 0.018 to 0.022 m/s
 - iii) Velocity of flow = 0.3 m/sec
- b) Design a primary settling tank (rectangular) for a town having a population of 50,000 with a water supply of 180 l/c/d. 6

UNIT-III

5. Design a Sludge digestion tank for 60000 persons. The solids content per day is 0.068 kg/c/d. The moisture of the sludge is 94 % & 3.5% of the digester volume is daily filled with the fresh sludge, which is mixed with digested sludge 12
- (OR)**
6. Explain in detail about working, construction of septic tank with soak pit 12

UNIT-IV

7. Explain in detail about electrostatic precipitator and bag house filter with neat sketch 12
- (OR)**
8. Explain in detail about adsorption and condensation process with neat sketch 12

UNIT-V

9. Explain in detail about the methods used to reduce noise pollution and its impact on human health. 12
- (OR)**
10. Explain in detail about types of noise, measurement of noise and noise standards. 12

**ELECTRIC DRIVES
(Electrical and Electronics Engineering)****Time: 3 Hours****Max Marks: 60**

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) Describe the operation of a dc drive in all four quadrants when fed by a single – phase dual converter, with necessary waveforms and characteristics? 6M
- b) A 220V DC motor has Armature resistance of 0.5Ω . it is drawing Armature current of 15A. Motor is braked by Dynamic braking when it is running under full load. Find the Braking Resistance to be inserted to limit the Braking current to 10A. 6M

(OR)

2. a) Describe counter current braking (plugging) in a separately excited dc motor with relevant circuit diagrams? 6M
- b) A 220V, 1500 rpm, 50A DC separately excited motor has an armature resistance of 0.5Ω is fed from a circulating current mode dual converter with 3-phase ac source voltage of 165V (line). Determine converter firing angles for the following operating conditions. 6M
 - a) Motoring operation at rated motor torque and 1000rpm.
 - b) Braking operation at rated motor torque and -1000rpm.

UNIT-II

3. a) Discuss the operation of a separately excited dc motor fed by a single phase converter? Draw the speed torque characteristics of such a motor with variation of firing angle α . 6M
- b) A separately excited DC motor of 220V, 1200rpm, and 8A has armature resistance of 0.75Ω . it is fed from a single phase fully controlled bridge rectifier whose source voltage is 230V, 50Hz. Assume load current to be continuous determine the following. 6M
 - a) motor speed at $\alpha = 45^\circ$ and torque of 8N-m,
 - b) Developed Torque at 45° and speed of 800rpm.

(OR)

4. a) Discuss the operation of a three phase full converter fed DC drive (separately excited) 6M
- b) Three phase full controlled converter controls a separately excited DC motor with armature resistance of 0.5Ω . At 900rpm it develops full load torque at an armature current of 20A at 430V. The triggering delay angle is zero. Find the rms voltage per phase of the ac supply and the range of delay angle control required to provide a speed between 900rpm and 450rpm at full load torque. 6M

UNIT-III

5. a) Derive and draw the speed- Torque characteristics of DC separately excited motor connected to Class-B chopper? 6M
- b) A Separately excited DC motor with armature resistance of 0.01Ω with DC supply of to 220V, 100A, 1000 rpm is Now Operated in dynamic braking with Chopper control with a braking resistance of 2Ω
- (i) Calculate duty ratio of the Chopper for a motor speed of 500 RPM and braking torque of 1.5 times the rated value. 6M
- (ii) What will be the motor speed for a duty ratio of 0.5 and motor torque equal to 1.5 times its rated torque?
- (OR)
6. Draw the circuit diagram and explain the operation of closed-loop speed control with inner-current loop and field weakening? 12M

UNIT-IV

7. a) Describe the method of speed control of an induction motor by V/F control and draw the speed torque characteristics? 6M
- b) A 3-phase 50kw 1475rpm 420V 50HZ 4-pole star-connected induction motor has the following data: $R_s=0.4\Omega$, $R_r=0.21\Omega$, $X_s=0.95\Omega$, $X_r=0.85\Omega$, $X_m=32\Omega$ all quantities being referred to the stator side. If the frequency increased to 58HZ by frequency control, determine (a) The slip at maximum torque (b) The speed at maximum torque (c) The break down torque 6M
- (OR)
8. a) Draw and explain the speed-torque curves with variable frequency control for two different modes. 6M
- i. Operation at constant flux
- ii. Operation at constant (V/f) ratio.
- b) A 3- ϕ , 440V, 4-pole, 50Hz star connected induction motor has rotor resistance of 0.2 ohms and equivalent reactance of 0.35 ohms per phase refer to stator. Stator impedance and Magnetizing branch can be ignored. Driving a load with its torque proportional to the speed the motor runs at 1450 RPM. Determine the magnitude and phase of the voltage (refer to Stator) to be impressed on the slip rings in order that the motor operates at 1200 RPM and unity power factor 6M

UNIT-V

9. a) Describe separate control mode of Synchronous motor? 4M
- b) A 440V, 3 phase, 50 Hz, 6 pole, 945 rpm, delta connected Induction Motor has the following parameters referred to the stator. $R_s = 2\Omega$, $R_r = 2\Omega$, $X_s = 3\Omega$, $X_r = 4\Omega$. When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine motor terminal voltage, current and torque at 800 RPM. 8M
- (OR)
10. a) Draw and explain the circuit diagram of a separate controlled synchronous motor fed from a three phase inverter. 6M
- b) What is the difference between true synchronous mode and self control mode for variable frequency control of synchronous motor? 6M

AR18

CODE: 18MET416

SET-1

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

IV B.Tech I Semester Regular Examinations, February-2022

**FINITE ELEMENT METHODS
(Mechanical Engineering)**

Time: 3 Hours

Max Marks: 60

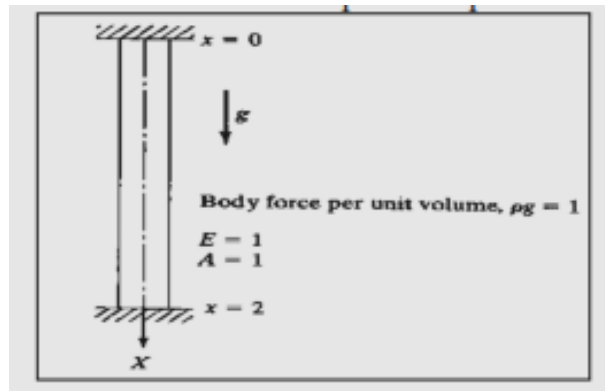
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

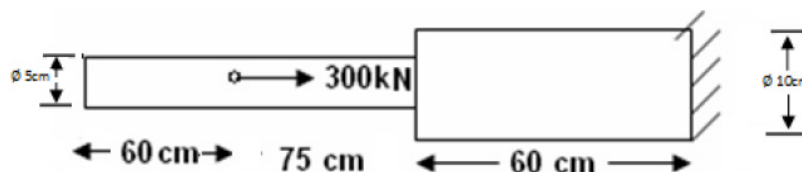
UNIT-I

1. a) Write the general steps of the finite element method. 6 M
b) Write the stress strain relations for 2-D, for plane stress and plane strain 6 M
- (OR)
2. Use Rayleigh Ritz method and find the midpoint displacement of the rod shown in figures below. 12 M



UNIT-II

3. a) Define the shape function. What are the properties of the shape functions? 6 M
b) Derive the stiffness matrix for a two noded bar element. 6 M
- (OR)
4. A stepped bar is subjected to an axial load of 300 kN as shown in figure. Find the nodal displacements, element stresses and strains and reactions. Take $E = 2 \times 10^5 \text{ N/mm}^2$. 12 M

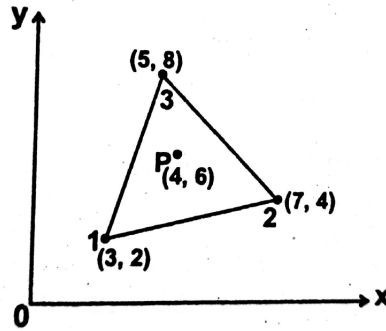


UNIT-III

5. a) Derive the transformation matrix from local to global nodal displacement for a plane truss element. 6 M

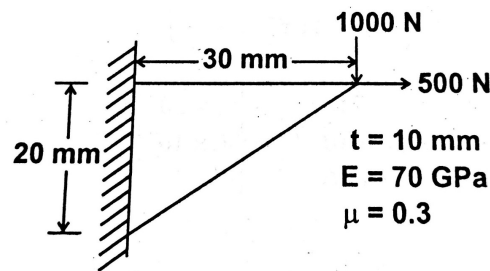
- b) Determine the shape functions N_1, N_2, N_3 at the inner point 'p' of the triangular element shown in the figure.

6 M



(OR)

6. For the two dimensional plate shown in fig. Determine the deflection at the point of load application.



UNIT-IV

7. Derive the Hermite shape functions for two noded 2D beam element.

12 M

(OR)

8. a) Derive the Gaussian sampling points and weights for 1x1 and 2x2 rules.
b) Evaluate the integral $I = \int_{-1}^1 (2x^2 + 3x + 4) dx$ in the limits of -1 to 1 using gauss quadrature numerical integration and verify with exact solution.

6M

6M

UNIT-V

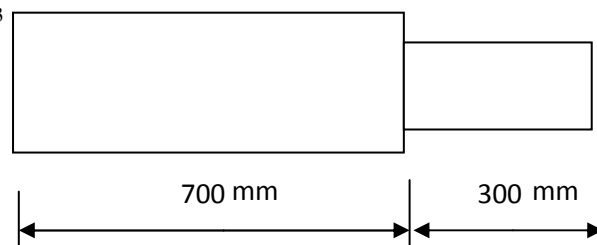
9. A bar rod of length 1 m and diameter 7 cm is fixed at one end. $E = 200 \text{ GPa}$ and density $= 7000 \text{ kg/m}^3$. Modelling the rod as two bar elements, determine the natural frequencies.

12 M

(OR)

10. Determine the natural frequency of a stepped bar element as shown below having individual areas of cross sections $A_1 = 100 \text{ mm}^2$ and $A_2 = 75 \text{ mm}^2$ $E = 30 \text{ N/mm}^2$ and density 7800 kg/m^3

12 M



AR18

CODE: 18ECT417

SET-1

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

IV B.Tech I Semester Regular Examinations, February-2022

**MICROWAVE ENGINEERING
(Electronics and Communication Engineering)**

Time: 3 Hours

Max Marks: 60

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) Derive the wave equation for a TE wave and obtain the field components in a rectangular wave guides? 8M
b) A rectangular waveguide has $a=4\text{cms}$, $b=3\text{cms}$ as it's sectional dimensions, find all the modes which will propagate at 5000MHz ? 4M
- (OR)
2. a) Derive the wave equation for a TM wave and obtain the field components in a rectangular wave guides? 8M
b) Explain the advantages of Microwave. 4M

UNIT-II

3. a) Explain about H-plane tee with suitable diagram and derive its Scattering matrix? 8M
b) In an H-plane Tee junction, 20mW power is applied to port 3 that is perfectly matched to the junction. Calculate the power delivered to the load 60Ω and 75Ω connected to ports 1 and 2. 4M
- (OR)
4. a) Draw and explain of directional coupler and explain coupling factor and directivity of directional coupler? 6M
b) What are the ferrite devices. Discuss in detail about Circulator with neat diagram. 6M

UNIT-III

5. a) A two-cavity amplifier klystron has the following parameters beam voltage $V_0=900\text{V}$, beam current $I_0=30\text{mA}$, frequency $f=8\text{GHz}$, gap spacing in either cavity $d=1\text{mm}$, spacing between centers of cavities $L=4\text{cm}$, effective shunt impedance $R_{sh}=40\text{K}\Omega$, determine (i)The electron velocity (ii)The dc electron transit time (iii)The input voltage for maximum output voltage (iv)The voltage gain in decibels. 8M
b) Derive the output power of Two-cavity klystron amplifier. 4M
- (OR)
6. a) A reflex klystron operates at the peak of $n=1$ or $3/4$ mode. The dc power input is 40mW and ratio of V_1 over V_0 is 0.278 . 6M
(i) Determine the efficiency of the reflex klystron.
(ii) Find the total power output in mW
b) Draw and explain of reflex klystron and write its applications. 6M

UNIT-IV

7. a) Explain the modes of resonance and PI mode operation? 6M
b) A normal cylindrical magnetron has the following parameters: 6M
Inner radius $R_a=0.15$ meter, outer radius $R_b=0.45$ meter, Magnetic flux density $B_0=1.2$ milliwebers/m².
(i) Determine the Hull cutoff voltage.
(ii) Determine the cutoff magnetic flux density if the beam voltage V_0 is 6000V. 7M
(OR)
8. a) An X-band pulsed cylindrical magnetron has $V_0=30$ kV, $I_0=80$ A, $B_0=0.01$ Wb/sq.m, $a=4$ cm, $b=8$ cm. Calculate 6M
(i) cyclotron angular frequency, (ii) cut-off voltage and (iii) cut-off magnetic flux density.
b) Discuss the working principle of magnetrons and list the important applications. 6M

UNIT-V

9. a) Explain the operation of RWH-Two valley theory with suitable diagrams? 6M
b) Draw and explain in detail about IMPATT diode? 6M
(OR)
10. a) Explain the measurement of microwave power using bolometer technique with neat sketch? 6M
b) With the help of necessary experimental setup, describe the measurement of unknown load impedance using slotted line? 6M

AR18

CODE: 18CST417

SET-1

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

IV B.Tech I Semester Regular Examinations, February-2022

**UML & DESIGN PATTERNS
(Computer Science and Engineering)**

Time: 3 Hours

Max Marks: 60

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) How does the object oriented approach differ from the traditional approach? 6M
b) Why is reusability important? 6M
- (OR)**
2. a) Describe the types of requirements in Unified Process Model. 6M
b) Explain different strategies to find conceptual classes. 6M

UNIT-II

3. a) Draw the use case diagram for Library management system and explain. 6M
b) List out the UML diagrams. Explain which diagrams are static and dynamic. Why? 6M
- (OR)**
4. a) Explain the architecture of domain model with a neat diagram. 6M
b) Explain about interaction diagrams in details. 6M

UNIT-III

5. a) Explain the common modelling techniques for deployment diagrams 6M
b) Explain the following terms 6M
i) Event ii) Signal iii) Time.
- (OR)**
6. a) Compare deployment diagram and component diagram. 6M
b) Explain the following: 6M
i) Process ii) Thread iii) Space

UNIT-IV

7. a) What is a design pattern? Explain the goals of good design. 6M
b) Explain design pattern in small talk MVC. 6M
- (OR)**
8. a) Explain how to select the design pattern. 6M
b) Explain how to use the design pattern. 6M

UNIT-V

9. a) Describe the abstract factory design pattern. 6M
b) Explain the adapter design pattern. 6M
- (OR)**
10. a) Compare and contrast the structural and behavioural patterns. 6M
b) Explain chain of responsibility design pattern. 6M

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 about Economics of System Development Life Cycle (SDLC)? 6M
b) Discuss about structured approach to testing and test factors? 6M
- (OR)
2. a) Explain about functional and structural testing? 6M
b) Illustrate about eight considerations in developing testing methodologies? 6M

UNIT-II

3. a) Explain about Black-Box and Boundary value in software testing? 6M
b) Discuss in detail about Cause-Effect graphing? 6M
- (OR)
4. a) Briefly explain about the Unit Testing techniques. 6M
b) Discuss about Regression Testing? 6M

UNIT-III

5. a) Explain in detail about the Acceptance Testing techniques. 6M
b) Explain about Requirements Phase Testing and Design Phase Testing? 6M
- (OR)
6. a) Discuss about Program Phase Testing? 6M
b) Explain about Testing Client/Server – Web applications? 6M

UNIT-IV

7. a) Discuss about waterfall model? 6M
b) Explain about Evolution of Software Economics? 6M
- (OR)
8. a) Explain about Software Economics? 6M
b) Explain about pragmatic software cost estimation? 6M

UNIT-V

9. a) Explain the principles of conventional software Engineering? 6M
b) Discuss about transitioning to an iterative process. 6M
- (OR)
10. a) Explain about Reducing Software product size? 6M
b) Discuss about Achieving required quality and peer inspections 6M

AR16

CODE: 16CE4026

SET-1

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

IV B.Tech I Semester Regular & Supplementary Examinations, February-2022

ENVIRONMENTAL ENGINEERING-II

(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. Differentiate between conservancy and water carriage systems. Explain carbon and nitrogen cycle of decomposition with a neat sketch. List out physical, chemical and biological tests to determine sewage characteristics. 14 M
- (OR)**
2. Explain with the help of neat sketches the components of a manhole and discuss the working mechanism and associated operational problems. 14 M

UNIT-II

3. Explain with a neat sketch on working and operational problems of trickling filters? Mention the advantages and disadvantages of the system? 14 M
- (OR)**
4. Explain different unit operations used in wastewater treatment plant with a neat sketch? 14 M

UNIT-III

5. With the aid of sketches, discuss the principles involved in design and construction of a septic tank? 14 M
- (OR)**
6. What is sewage farming? What are its advantages over the method of disposal of sewage by dilution? What precautions should be taken to avoid the health hazards either to the farm workers or the consumer using the produce? 14 M

UNIT-IV

7. Describe with a neat sketch the principle, working, advantages, cleaning mechanism and application of fabric filters? 14 M
- (OR)**
8. Write a short note on (i) Inversions; (ii) Lapse rate; (iii) plume behaviour (describe with neat sketches how different atmospheric conditions give rise to different kinds of plumes) 14 M

UNIT-V

9. Explain in detail about the sources and impacts on human health due to noise pollution? 14 M
- (OR)**
10. Discuss in detail the preventive and control measures to reduce noise pollution? 14 M

AR16

CODE: 16EE4023

SET-1

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

IV B.Tech I Semester Regular & Supplementary Examinations, February-2022

POWER SEMICONDUCTOR DRIVES

(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) How Plugging and Dynamic braking is applied for the DC shunt and series motors 6M
b) A 230 V, 500 rpm, 100 A separately excited dc motor has an armature resistance of 0.1 ohms is now coupled to an overhauling load with a torque of 800 N-m. Determine the speed at which the motor can hold the load by regenerative braking. Source voltage is 230 V. Neglect the motor's rotational losses 8M
- (OR)
2. a) Explain the four quadrant operation of DC motor with dual converter 7M
b) Mention the disadvantage of the non-circulating mode operation of the dual converter 7M

UNIT-II

3. a) Explain the operation of the 3-Ph. Semi converter with DC shunt motor in all regions of the firing angle and draw the speed torque characteristics 6M
b) A 230 V, 500 rpm, 100 A separately excited dc motor has an armature resistance of 0.1 ohms. The motor is driving, under rated conditions, a load whose torque is constant and independent of speed. Calculate (1) the motor terminal voltage when the speed is 400 rpm. (2). By what amount should flux be reduced to get a motor speed of 800 rpm? 8M
- (OR)
4. a) Explain the operation of three phase fully controlled converter with RLE load for rectifier operation and inverter operation with wave forms 6M
b) Explain the four quadrant operation of DC motor drive by dual converter 8M

UNIT-III

5. a) Explain the closed loop control of the chopper derived DC motor 6M
b) 230 V, 500 rpm, 90 A separately excited DC motor has the armature resistance and inductance of 0.115 ohms and 11 mH respectively. The motor is controlled by a chopper operating at 400 Hz. If the motor is regenerating, 1. Find the motor speed and the regenerated power at the rated current and a duty ratio of 0.5. 8M
- (OR)
6. How four quadrant operation is achieved by the separately excited DC motor with chopper with sketch and wave forms 14M

UNIT-IV

7. a) Explain the operation of 1-Ph. AC voltage controller with induction motor as a load. Draw the circuit diagram and wave forms 7M
- b) Explain the braking methods for 3-Ph. Induction motor (1) Regenerative braking (2) Plugging or reverse voltage braking (3) Dynamic or rheostat braking. With neat characteristics 7M
- (OR)**
8. a) What are advantages of V/F control method? How do you achieve this PWM Inverter with sketch 7M
- b) Explain the block diagram of V/F control of 3-Ph. Induction Motor. Also draw the characteristics of the motor above and below rated speeds 7M

UNIT-V

9. a) Explain the Static Kramer Drive draw its characteristics 6M
- b) Explain the closed loop operation of synchronous motor drive. 8M
- (OR)**
10. Separate control & Self-control of synchronous motors with neat circuit diagram and also draw the block diagram 14M

POWER SEMI CONDUCTOR DRIVES**(Electrical & Electronics Engineering)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) What are the three intervals present in discontinuous conduction mode of single phase half controlled rectifier?
- b) What are the functions performed by electric drives?
- c) What is meant by regenerative braking?
- d) What are the methods of operation of electric drives?
- e) State the advantages of dc chopper drives?
- f) What are the types of control strategies in dc chopper?
- g) What are the 3 modes of region in the adjustable-freq IM drives characteristics?
- h) Where is the V/f control used?
- i) Why the static scherbius drive has a poor power factor?
- j) How is super synchronous speed achieved?

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. Explain the operation of single phase full controlled rectifier control of dc separately excited motor for continuous and discontinuous modes of operations with aid of diagrams and waveforms. Also obtain the expression for motor terminal voltage and speed. 12M
- (OR)
3. Explain the operation of Three phase half controlled rectifier control of dc series motor for continuous and discontinuous modes of operations with aid of diagrams and waveforms. Also obtain the expression for motor terminal voltage and speed. 12M

UNIT-II

4. a) Describe the single phase four quadrant operation of separately excited dc motor using dual converters. 6M
- b) Explain the closed loop operation of DC motor drive. 6M

(OR)

5. a) What are the advantages electrical braking over the mechanical braking? 5M
- b) A 220V dc series motor runs at 1200 rpm and takes an armature current of 100A. When driving a load with a constant torque. Resistance of armature and field windings are 0.05 ohm each. Dc series motor is operated under dynamic braking at twice the rated torque and 1000rpm. Calculate the value of braking current and resistance. Assume linear magnetic circuit. 7M

UNIT-III

6. a) Explain what the applications of chopper fed dc drives ? 4M
- b) A DC chopper is used for regenerative braking of a separately excited DC motor. The supply input voltage is 400 V, $R_a = 0.2 \Omega$, $K_m = 1.2$ V-sec/rad. The average armature current during regenerative braking is kept constant at 300 A. For a duty cycle of 60% of chopper, determine the following: (i) Power returned to supply. (ii) Minimum and maximum braking speeds. 8M
- (OR)**
7. Explain the four quadrant operation of chopper fed dc series motor with aid of diagrams and waveforms and speed torque expressions. 12M

UNIT-IV

8. a) Explain and compare the operation of VSI and CSI fed induction drives? 6M
- b) A three-phase, 440 V, 1000 rpm slip ring induction motor is operating with 4 % slip. Stator current is 30 A. Determine the stator current if the speed of the motor is reduced to 500 rpm using stator voltage control method. 6M
- (OR)**
9. Explain the stator voltage control schemes of induction motor, also draw and explain the speed torque curves. 12M

UNIT-V

10. Explain how the slip will recover by Static Scherbius with various Modes of Operation? 6M
- (OR)**
11. a) Draw the circuit diagram and explain the operation of Self Controlled Synchronous motor drive employing load commutated inverter. 6M
- b) Explain the closed loop operation of synchronous motor drive. 6M