AR18

CODE: 18CET419 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, February-2023

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 sewer appurtenances 12

(OR)

2. Calculate the combined flow discharge of sewage for the following data. 12
   a) Area to be served = 75 km^2
   b) Population of the locality = 50000
   c) Time of entry = 5 minutes
   d) Time of flow = 20 minutes
   e) Rate of water supply = 135 lpcd
   f) Impermeability factor = 0.45

   Assume 85% of water supplied turns into sewer and peak factor as 2.

UNIT-II

3. Determine the size of a high rate trickling filter for the following data 12
   a) flow = 4.5MLD
   b) BOD of the sewage =250mg/L
   c) BOD removed in the primary clarifier = 25%
   d) Final effluent BOD desired = 50 mg/L
   e) Recirculation ratio =1.4

(OR)

4. Explain in detail about conventional activated sludge process with different types 12

UNIT-III

5. Design a septic tank for a small colony of 150 persons provided with an assured water supply from the municipal head works at rate of 120 litres/person/day. Assume necessary data. 12

(OR)

6. a) Explain in detail about anaerobic sludge digestion process 6
   b) Explain in detail about aerobic sludge digestion process 6

UNIT-IV

7. Explain in detail about sources and classification of air pollution. 12

(OR)

8. Explain in detail about methods for controlling particulate matter. 12

UNIT-V

9. Explain in detail about sources standards of noise pollution. 12

(OR)

10. Explain in detail about different methods used for controlling noise pollution 12

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AR18

CODE: 18EEE431 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, February-2023

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) State and explain the important features of dynamic braking method of dc motors. 6M

   b) Explain the operation of a closed-loop speed control scheme with inner current control loop. What are various functions of inner current control loop? 6M

(OR)

2. Explain, with sped torque characteristics, four quadrant operation of dc separately excited motor fed from dual converter with simultaneous control. 12M

UNIT-II

3. Explain the operation of single phase fully controlled rectifier control of dc separately excited motor with the help of drive circuit, motor terminal voltage, current waveforms and speed torque characteristics for various firing angles. Assume continuous conduction. 12M

(OR)

4. a) A 220 V, 960 rpm, 12.8 A separately excited dc motor has armature circuit resistance and inductance of 2 Ohm and 150 mH, respectively. It is fed from a single-phase half-controlled rectifier with an ac source voltage of 230 V, 50 Hz. Assume continuous conduction and $T>T_C$. Calculate 8M

   i. Motor torque for $\alpha = 60^0$ and speed = 600 rpm.
   ii. Motor speed for $\alpha = 60^0$ and T = 20 N-m.
   Where T_C is critical torque.

   b) Write limitations of rectifier fed dc drives compared to chopper fed drives. 4M

UNIT-III

5. a) Describe the first quadrant chopper control of DC series motor with necessary diagrams. 6M

   b) A 220 V, 24 A, 100 rpm, separately excited dc motor has an armature resistance of 2 Ω. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230 V. Calculate the duty ratio for 1.2 times rated torque and 500 rpm. 6M

(OR)

6. Explain the four quadrant fed DC motor drive in detail 12M

UNIT-IV

7. a) Why stator voltage control is suitable for speed control of induction motors in fan and pump drives? 6M

   b) Give the relative advantages and disadvantages of CSI and VSI drives. 6M

(OR)

8. a) Why stator voltage control is an inefficient method of induction motor speed control? 6M

   b) Justify the following statement, for variable frequency control of induction motor, the motor has higher efficiency and better low speed performance when fed from PWM inverter instead of 6-step inverter. 6M

UNIT-V

9. Describe the operation of Static Scherbius Drive with relevant circuit diagram? 12M

(OR)

10. a) A 440 V, 50 Hz, 970 rpm,6-pole, Y-connected 3-phase wound rotor induction motor has the following parameters referred to the stator: 6M

    $R_S = 0.1\ \Omega$, $R'_r = 0.08\ \Omega$, $X_S = 0.3\ \Omega$, $X_r' = 0.4\ \Omega$

    The stator to rotor turns ratio is 2, motor speed is controlled by static Scherbius drive. Drive is designed for a speed range of 25% below the synchronous speed. Maximum value of firing angle is 165^o. Compute

    (i) Transformer turns ratio

    (ii) Torque for a speed of 780 rpm and $\alpha = 140^o$.

    DC link inductor has a resistance 0.01 Ω.

    b) Explain the self-controlled mode operation of a synchronous motor. 6M

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AR18

CODE: 18MET416 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, February-2023

FINITE ELEMENT METHODS

(Mechanical Engineering)

Time: 3 Hours **Max Marks: 60**

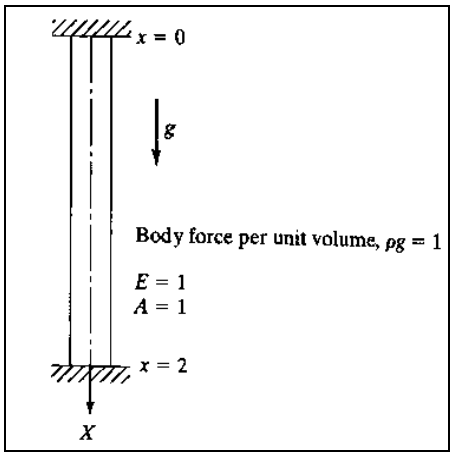
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Distinguish between Cartesian and natural coordinate system. 6M
   b) The following stresses are developed in a plate under plane stress $\sigma_{xx} = 12MPa, \sigma_{yy} = 14MPa$, $\sigma_{xy} = 5Mpa$. Determine the strains induced in the plate, assuming that E = 209 GPa and ν =0.3 6M

(OR)

2. Use Rayleigh Ritz method to find the displacement of the midpoint of the rod shown in Figure below. 12M

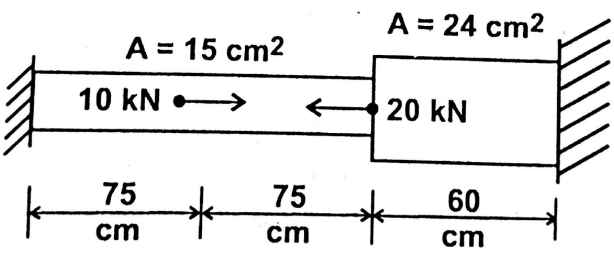


UNIT-II

3. Using two finite elements, find the stress distribution in uniformly tapering bar of circular cross sectional area 3 cm^2 and 2 cm^2 at their ends, length 100 mm, subjected to an axial tensile load of 50 N at smaller end and fixed at larger end. Take the value of Young's modulus 2×10^5 N/mm^2 12M

(OR)

4. For a stepped bar loaded as shown in figure , determine (a) nodal displacements (b) support reactions and (c) elemental stresses 12M



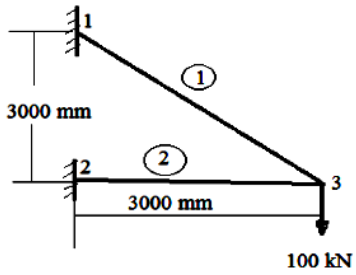
$E = 20\times10^6 N/cm^2, \Delta T = 10^0 C,\ \alpha = 11\times10^{-6}/^o C$

UNIT-III

5. Derive the stiffness matrix for the constant strain triangular (CST) element 12M

(OR)

6. For the two-bar truss shown in figure, determine the displacements and stress. $A_1=500mm^2$, $A_2=1200mm^2$, $E=2x10^5$ N/mm^2 . 12M



UNIT-IV

7. Define beam element and derive the its Hermite shape functions in global co-ordinate system. 12M

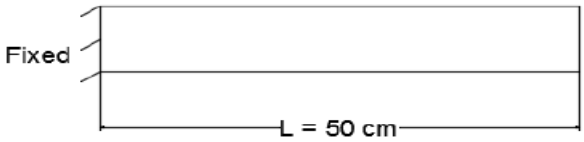
(OR)

8. a) Solve the double integral with the limits -1 to + 1 for the function $I = 4x^2y + 3x^3 + 4y^2$ using Gaussian Quadrature method and compare with the exact solution. 6M

   b) List out various advantages by using the concept of numerical integration and its utility in generating Isoperimetric finite element matrices. 6M

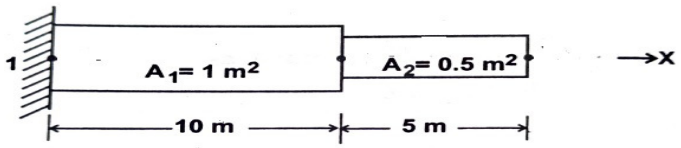
UNIT-V

9. Find the natural frequencies of longitudinal vibration of the bar shown in figure by taking two elements. A = $1.5x10^{-3}$ m^2, E=210 GPa, Density =7850 kg/m^3 12M



(OR)

10. Determine the eigen values and natural frequencies for the stepped bar shown in figure 12M



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AR18

CODE: 18ECT417 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, February-2023

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 expressions for field components of TM wave in rectangular waveguide. 8M
   b) The dimensions of an air dielectric waveguide working at 5.2GHz are 4.75×2.21 cm. Find its (a) dominant mode cut-off frequency and (b) guide wavelength. 4M

(OR)

2. a) Derive the expressions for field components of TE wave in rectangular waveguide. 8M
   b) An air filled rectangular wave guide operated in TE_{10} mode has dimensions of a= 6 cm and b = 4 cm. The signal frequency is 3 GHz. Find: (i) Cut-off wavelength (ii) Phase constant. 4M

UNIT-II

3. a) What is the magic associated with a magic TEE? Draw a neat sketch of magic TEE and explain its operation. List its applications. 8M
   b) Find the S- Matrix for a matched isolator having an insertion loss of 0.5 dB and isolation of 20 dB. 4M

(OR)

4. a) What is a Gyrator? Describe how isolators can be realized by using Gyrators. 6M
   b) Derive the s-matrix for 3-port circulator. 6M

UNIT-III

5. a) What are the constructional differences of two cavity klystron and reflex klystron? Derive the velocity modulation equation of two cavity klystron. 8M
   b) A two cavity klystron amplifier has the following parameters: V_0=600 V, R_0= 30 KΩ, I_0 = 20mA, gap spacing d=1 mm, cavity spacing L = 4cm. Find (i) The gap transit angle, (ii) DC transit angle. 4M

(OR)

6. a) Draw the Applegate diagram of Reflex klystron and explain all the components involved. 6M

   b) A reflex klystron operates with V_0 = 500 V, R_{sh} = 20 KΩ, F_r = 8 GHz, L = 1 mm, n = 2 mode. 6M

   Find i) The direct current necessary to give a gap voltage of 200 V

   ii) Calculate the electronic efficiency

UNIT-IV

7. a) What is the purpose of slow wave structure in TWT? Explain the amplification process in helix TWT amplifier with neat sketches. 6M

   b) Write a brief notes about suppression of oscillations in Travelling Wave Tube Amplifier. 6M

(OR)

8. a) Explain the construction of 8 cavity cylindrical magnetron with a neat sketch. Explain the pi mode of operation of magnetron. 8M

   b) An X band pulsed cylindrical magnetron operates with V_0 = 32 KV, I_0 = 84 A, 4M

   B_0 = 0.01 Wb/m^2, a = 6 cm, b= 12 cm.

   Find i) Cyclotron angular frequency

   ii) The cutoff voltage for a fixed B_0

   iii) The cutoff magnetic flux density for a fixed V_0

UNIT-V

9. a) Explain the construction and operation of IMPATT diode with necessary diagrams. 6M

   b) What are the advantages of using the Gunn diode compared with the IMPATT diode? 6M

(OR)

10. a) Draw a microwave bench setup to measure the attenuation of given fixed attenuator using RF - substitution Method. 6M

    b) Draw a microwave bench setup to measure the frequency. 6M

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AR18

CODE: 18CST417 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, February-2023

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)	Write in detail about the conceptual model explaining structural UML diagrams	6M
	b)	Explain about software development life cycle(SDLC) for UML	6M
		(OR)	
2.	a)	Explain the CLASS diagram with an Example	6M
	b)	Explain in detail about object diagrams with an example	6M

UNIT-II

3.	a)	Build a Sequence diagram with the relative number of objects	6M
	b)	What is Use Case. Explain different elements in Use Case with an Example	6M
		(OR)	
4.	a)	Distinguish the Use Case diagram and Activity diagram	6M
	b)	Construct an Activity Diagram for Library Management System	6M

UNIT-III

5.	a)	Explain the following i)Call Events ii) Sending and Receiving events	6M
	b)	Summarize the concept of Signal in UML	6M
		(OR)	
6.	a)	What are the differences between Component and Deployment Diagram.	6M
	b)	List out the basic elements to sketch a deployment diagram with an example	6M

UNIT-IV

7.	a)	Write a short note describing design patterns.	6M
	b)	What is a design pattern explain the goals of good design	6M
		(OR)	
8.	a)	Interpret the steps in selecting a design pattern	6M
	b)	List out the Taxonomies of design patterns	6M

UNIT-V

9.	a)	Exhibit the Working of abstract factory patterns along with their Merits and Demerits	6M
	b)	Explain the Chain of Responsibility Pattern with the help of a UML diagram.	6M
		(OR)	
10.	a)	Discuss Adapter Pattern. Explain with the help of a Class Diagram.	6M
	b)	Difference between the Factory Method and the Abstract Factory Method.	6M

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AR16

CODE: 16EE4023 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, February-2023

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) State what is regenerative braking and explain regenerative braking in separately exited motor. 7M

   b) A 400V, 25h.p.(18.65KW), 450 r.p.m DC shunt motor is braked by plugging when running on full load. Determine resistance necessary if the maximum braking current is not to exceed twice the full load current. Also determine the maximum braking Torque and the braking torque when the motor just reaches zero speed. The efficiency of the motor is 74.6% and the armature resistance is 0.2Ω. 7M

(OR)

2. 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? 7M

   b) State what is dynamic braking and explain dynamic braking in series motor. 7M

UNIT-II

3. a) Describe the operation of single phase fully controlled rectifier fed to a DC series motor and obtain the expression for motor speed for continuous mode of operation. 7M

   b) Explain three phase fully controlled converter fed DC motor drive. 7M

(OR)

4. a) Describe the operation of single phase Semi Controlled Converter connected to dc Series Motor. 7M

   b) A 220V, 20A, 1500 rpm. DC separately excited motor with Armature Resistance of 0.2Ω is fed from a Three phase full converter. Available AC source has line voltage of 400V, 50Hz. A star-star connected Transformer is used to feed the Armature. Find the Firing angle of the converter when the motor is running at rated speed and supplying Rated Torque. (Assume continuous conduction mode) 7M

UNIT-III

5. a) Describe the Operation of type B or step up Chopper fed to separately excited DC motor.Draw Voltage and Current waveforms. Obtain speed torque equation and draw speed-Torque characteristics — 8M

   b) A 210V, 25A, 1500rpm dc motor has an armature resistance of 3Ω is controlled by chopper. The chopping frequency is 500Hz and input voltage is 230V. Calculate the duty ratio for a torque of 1.5 times the rated torque at 800rpm? — 6M

(OR)

6. a) Explain the four quadrant fed DC motor drive — 7M

   b) Draw the circuit diagram and explain the operation of closed-loop speed control with inner-current loop and field weakening? — 7M

UNIT-IV

7. a) Using a diagram and torque speed curve, explain the stator voltage control scheme for the speed control of a three phase induction motor? — 7M

   b) Explain comparison between VSI and CSI — 7M

(OR)

8. a) Describe the method of speed control of an induction motor by V/F control and draw the speed torque characteristics? — 7M

   b) A 440 V,50 Hz ,6 pole ,Y-connected squirrel cage induction motor has the following parameters :R=0.6Ω, R =0.3Ω, X=1Ω, X =1Ω and motor full load slip is 0.05. The motor is controlled by a voltage source inverter at constant V/f ratio. For an operating frequency of 10 Hz calculate the breakdown torque and speed at which it occurs. — 7M

UNIT-V

9. a) The rotor of a 4-pole,50HZ wound-rotor induction motor has a resistance of 0.3Ω per phase and runs at 1440rpm at full load. Calculate the external resistance per phase which must be added to lower the speed to 1320rpm, the torque being the same as before. — 7M

   b) Explain the difference between Rotor Resistance control methods and slip power recovery schemes? — 7M

(OR)

10. Describe the operation of Static scherbuis Drive with relevant circuit diagram? — 14M