

AR18

CODE: 18CET419

SET-1

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

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

**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. a) Explain Physical and Chemical Characteristics of Sewage in detail. **6M**
b) Explain in detail about Nitrogen cycle of Decomposition with neat sketch. **6M**
(OR)
2. a) Explain in detail about Manholes with neat sketch. **6M**
b) Determine the size of circular sewer for a discharge of 500 l/s running half full. **6M**
Assume $i=0.0001$ and $n=0.015$.

UNIT-II

3. a) Draw the neat sketch of Layout or general outline of a waste water treatment plant and mention objectives of each unit. **6M**
b) Differentiate between Trickling filter and Activated sludge process. **6M**
(OR)
4. a) With a neat sketch, explain Biological treatment by Trickling filters. **6M**
b) Design a rectangular Sedimentation tank to treat 5.2 million litres of raw water per day. The detention period may be assumed to be 3 hours. **6M**

UNIT-III

5. a) What is meant by Sewage farming? Explain in detail. **6M**
b) What are the various factors effecting Sludge digestion? Explain in detail. **6M**
(OR)
6. a) Explain in detail about sludge digestion. **6M**
b) Design a Septic tank for a gated community of 400 persons provided with water supply of 135 liters per person per day. Assume any data required. **6M**

UNIT-IV

7. a) Write any six Air Quality Standards. **6M**
b) What are the various Air pollution control methods? Explain in detail. **6M**
(OR)
8. a) What are the various Impacts of Air pollution on Human health? Explain in detail. **6M**
b) What are the various Sources of Air Pollutants? Explain in detail. **6M**

UNIT-V

9. a) What is meant by Noise Pollution? Explain in detail. **6M**
b) Write permissible limits of Noise pollution at day time and night time. **6M**
(OR)
10. a) Explain impacts of Noise on Human health in detail. **6M**
b) What are the various Equipment/Instruments used to measure Noise? Explain any one in detail. **6M**

**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 what is regenerative braking and explain regenerative braking in separately excited motor. 6M
 - 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 . 6M
- (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? 6M
 - b) State what is dynamic braking and explain dynamic braking in series motor. 6M

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. 6M
 - b) A 230V, 750rpm, 25A DC series motor has a combined resistance of armature and field 1Ω . It is fed from a single phased half controlled rectifier with an AC source voltage of 400V, 50Hz. Assuming continuous conduction, calculate firing angle for speed of 750 rpm and speed of 400rpm. 6M
- (OR)**
4. a) Describe the operation of single phase Semi Controlled Converter connected to dc Series Motor. 6M
 - 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) 6M

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 6M
- 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) A 230V separately excited DC motor takes a 50A at speed of 800 r.p.m. It has armature resistance of 0.4Ω . This motor is controlled by a chopper with an input voltage of 230V and frequency of 500Hz. Assuming continuous conduction throughout. Find the Speed and Torque for motoring operation at duty ratios of 0.3. Find the Speed and Torque for Regenerative braking operation at duty ratio of 0.7. 6M
- b) Draw the circuit diagram and explain the operation of closed-loop speed control with inner-current loop and field weakening? 6M

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? 6M
- b) A three phase, star-connected, 30hp, 480V, six pole, 60Hz, slip ring induction motor has a stator resistance $R_1 = 0.5\Omega$ and a rotor resistance referred to stator $R'_2 = 0.5\Omega$. The motor runs at a speed of 1200rpm. Assume that the load torque is constant and equal to 120Nm. Ignore the rotational losses and calculate the motor speed at full voltage. Repeat the computation if the voltage is reduced by 20%. 6M

(OR)

8. a) Describe the method of speed control of an induction motor by V/F control and draw the speed torque characteristics? 6M
- b) A 440 V, 50 Hz, 6 pole, Y-connected squirrel cage induction motor has the following parameters: $R = 0.6\Omega$, $R = 0.3\Omega$, $X = 1\Omega$, $X = 1\Omega$ 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. 6M

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. 6M
- b) Explain the difference between Rotor Resistance control methods and slip power recovery schemes? 6M

(OR)

10. a) Describe the operation of Static Scherbus Drive with relevant circuit diagram? 6M
- b) A 3-phase, 4-pole, 50Hz induction motor has a chopper controlled resistance in the rotor circuit for speed control. Load torque is ω^2 . When the thyristor is ON, the torque is 40 N-m at an average slip of 0.04. If $T_{ON}/T_{OFF} = 1$, compute the average torque and speed. The motor develops a torque of 75% when the thyristor is off. If the speed variation range is down to 1250rpm from synchronous speed. Determine the ratio T_{ON}/T_{OFF} require to obtain the average torque of 35N-m. 6M

AR18

CODE: 18MET416

SET-1

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

IV B.Tech I Semester Regular & Supplementary Examinations, November-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 down the stress- strain relationships for plane-stress and plane-strain conditions. 6M
- b) For a plane stress condition, the strains are $\epsilon_x=0.0012$, $\epsilon_y=0.00123$, $\gamma_{xy}=0.00024$, Calculate the corresponding stresses. The Young's modulus and Poisson's ratio of the material are $E=210\text{GPa}$ and $\nu=0.3$ 6M

(OR)

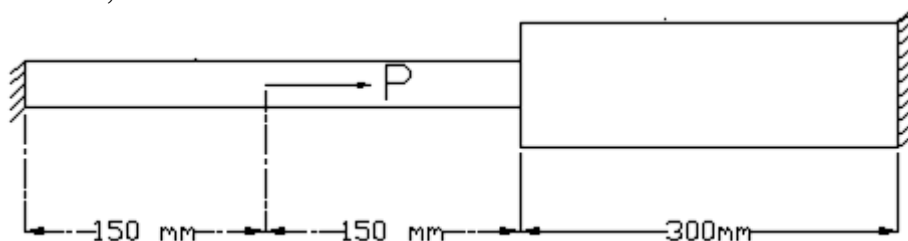
2. a) The stress field of a $10\text{cm} \times 8\text{cm} \times 6\text{cm}$ cuboid is given as: 8M
 $\sigma_x = (x^2 + xy + z)\text{N/cm}^2$, $\sigma_y = (y^2 + z)\text{N/cm}^2$, $\sigma_z = 0$, $\tau_{xy} = 0$, $\tau_{xz} = x^2 + z$,
 $\tau_{yz} = x + y^2 + 2z$,
Calculate the total body force in x, y, and z direction respectively at the point (1,2,1)
- b) The displacement components in micro units are 4M

$$u = x^2 + y, v = 3 + z, w = x^2 + 2y$$

Determine the rectangular strain components.

UNIT-II

- 3 Calculate the nodal displacements and stresses at each element of the following bar as shown in **Fig.**. Use 2-noded bar elements. 12M
 $P = 2 \times 10^5\text{N}$, $E = 200\text{ GPa}$.



(OR)

4. a) Consider the bar shown in **Fig. 2**. An axial load of 85000N at 6M element 2, and a uniformly distributed load of 5000N/m are acting at element 3. The temperature of all the elements are increased by 40°C. Calculate the assembled stiffness matrix and load vector.

b)

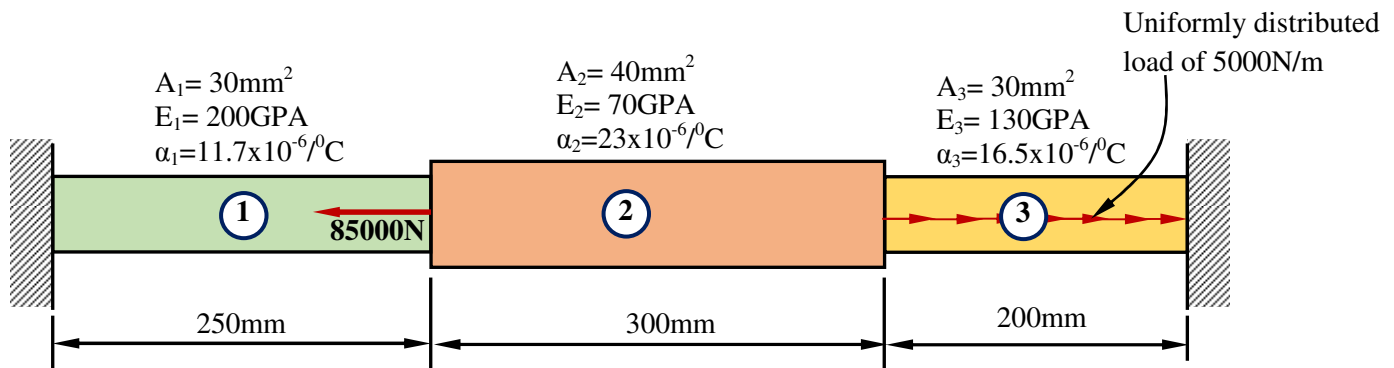


Fig. 2

Determine the nodal displacements and reaction forces at the supports of the bar shown in **Fig 2**

UNIT-III

5. a) State the differences among bar, truss and beam. 2M
 b) Calculate the deflections of node 2 and 3, stresses at each element and reaction forces of the truss shown in **Fig. 3**. 10M

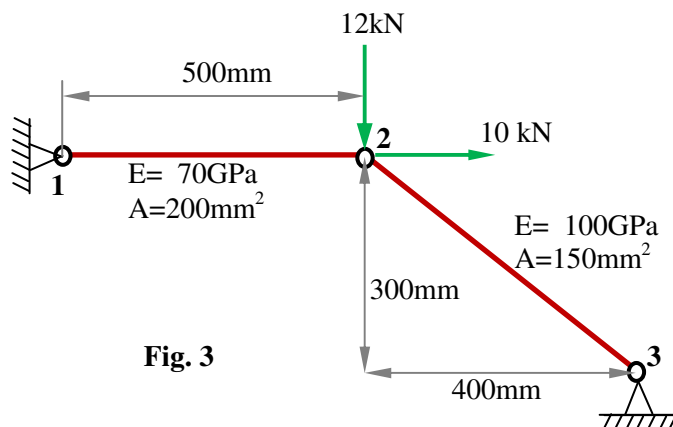


Fig. 3

(OR)

6. A rectangular plate is discretized by two triangular elements as shown in **Fig. 4**. Each node having two degrees of freedom. The elemental level governing equations are given below in matrix form. Calculate the assembled stiffness matrix, load vector. Calculate the nodal values after applying the boundary conditions by elimination approach. The boundary conditions are given as: $u_1=2, v_1=5, v_3=6, u_4=0, v_4=0$.
 ${}^1R_{1x}, {}^1R_{1y}, {}^1R_{3y}, {}^2R_{3y}, {}^2R_{4x}, {}^2R_{4y}$ are reactions forces at the supports. 12M

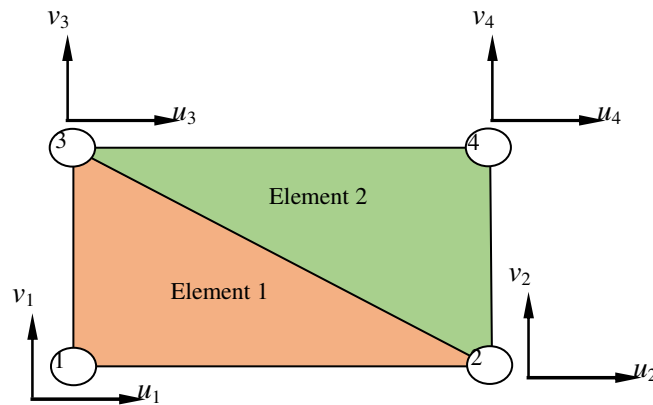


Fig. 4

$$\begin{bmatrix} 1 & 11 & 8 & 3 & 0 & 4 \\ 11 & 2 & 7 & 6 & 5 & 3 \\ 8 & 7 & 12 & 4 & 0 & 1 \\ 3 & 6 & 4 & 8 & 8 & 4 \\ 0 & 5 & 0 & 8 & 9 & 7 \\ 4 & 3 & 1 & 4 & 7 & 4 \end{bmatrix} \begin{Bmatrix} u_1 \\ v_1 \\ u_2 \\ v_2 \\ u_3 \\ v_3 \end{Bmatrix} = \begin{Bmatrix} {}^1R_{1x} \\ {}^1R_{1y} \\ 9 \\ 14 \\ 7 \\ {}^1R_{3y} \end{Bmatrix}$$

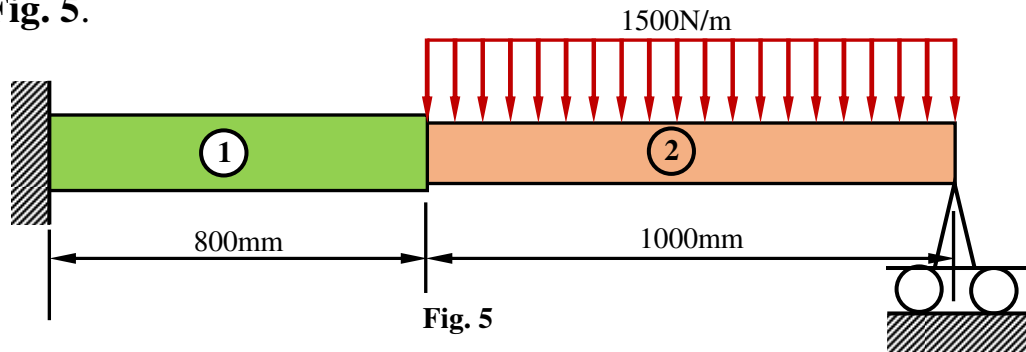
$$\begin{bmatrix} 5 & 8 & 0 & 9 & 10 & 3 \\ 8 & 10 & 3 & 2 & 4 & 3 \\ 0 & 3 & 12 & 1 & 7 & 1 \\ 9 & 2 & 1 & 8 & 3 & 4 \\ 10 & 4 & 7 & 3 & 14 & 6 \\ 3 & 3 & 1 & 4 & 6 & 5 \end{bmatrix} \begin{Bmatrix} u_2 \\ v_2 \\ u_3 \\ v_3 \\ u_4 \\ v_4 \end{Bmatrix} = \begin{Bmatrix} 8 \\ 18 \\ 7 \\ {}^2R_{3y} \\ {}^2R_{4x} \\ {}^2R_{4y} \end{Bmatrix}$$

UNIT-IV

7. a) State the assumptions of Classical/Euler-Bernoulli beam theory? 2M
 b) Derive the elemental level equation for a 2-noded Euler-Bernoulli beam element subjected to nodal forces and moments, and uniformly distributed transverse load. 10M

(OR)

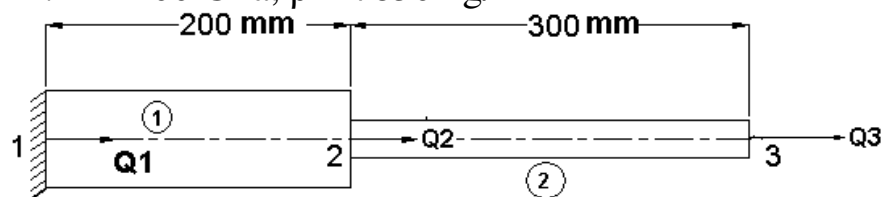
8. a) Define C^0 and C^1 continuity? 2M
 b) Calculate the nodal deflection and slopes of the beam shown in 10M
Fig. 5.



Element 1	Element 2
$E_1 = 200 \text{ GPa}$	$E_2 = 150 \text{ GPa}$
$I_1 = 4 \times 10^6 \text{ mm}^4$	$I_2 = 2 \times 10^6 \text{ mm}^4$

UNIT-V

9. Determine the natural frequencies by solving the eigen value problem for the stepped bar shown in the figure below. Also find eigen vectors and draw the mode shapes. $A_1 = 1200 \text{ mm}^2$, $A_2 = 900 \text{ mm}^2$. $E = 200 \text{ GPa}$, $\rho = 7850 \text{ kg/m}^3$ 12M



(OR)

10. a) Derive the mass matrix for a 2-noded bar element. 8M
 b) What are consistent and diagonal mass matrices? What are the different schemes to convert a consistent mass matrix to a diagonal mass matrix? What is the advantage of diagonal mass matrix? 4M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****IV B.Tech I Semester Regular & Supplementary Examinations, November-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) Illustrate the field patterns of TE_{10} and TE_{20} modes in rectangular waveguides with neat sketches. 6M
- b) The ratio of dimensions of an air filled rectangular waveguide is $a/b = 2$. Its cut-off wavelength is 3.32cm. (i) Find the dimensions of the waveguide (ii) Phase shift constant at 12 GHz. 6M

(OR)

2. a) State the formulas for the following parameters related to rectangular waveguide operated in TE_{mn} mode: 6M
 - i. Cutoff frequency
 - ii. Propagation constant
 - iii. Wavelength in the waveguide
 - iv. Phase velocity
- b) The cross section of a rectangular waveguide is 20 cm x 5 cm. Find 6 lowest order modes which will propagate on the waveguide and their cut-off frequencies. 6M

UNIT-II

3. a) Explain the characteristics of Ferrite materials. With neat diagram explain the construction and operation of Circulator. 6M
- b) Why is the significance of S-matrix in the analysis microwave analysis? 6M

(OR)

4. a) Explain the construction and working principle of rotary vane attenuator with neat sketches. 6M
- b) Derive the scattering matrix of directional coupler? 6M

UNIT-III

5. a) Apply velocity modulation concept and develop a mathematical expression for the velocity of electrons after crossing the input cavity gap, in a two cavity klystron amplifier. 6M
- b) A two cavity klystron amplifier has the following parameters: $V_0=900$ V, $I_0 = 30$ mA, gap spacing $d=1$ mm, cavity spacing $L = 4$ cm, $f=8$ GHz, $R_{sh} = 40$ K Ω . Find (i) Electron Velocity (ii) The gap transit angle, (iii) DC transit Time 6M

(OR)

6. a) Derive the expression for bunching parameter of reflex klystron. 6M
- b) A reflex klystron has the following parameters: $V_0=600$ V, $I_0 = 11.45$ mA, the tube is oscillating at f_r at the peak of the $n = 2$ mode. Assume that $X^1 = 1.841$ and $J_1(X^1) = 0.582$. Find (i) AC output power, (ii) Efficiency of the tube. 6M

UNIT-IV

7. a) Write the advantages and applications of TWT. 6M
- b) What is slow wave structure? Draw different types of slow waves structures used in travelling wave tubes. 6M

(OR)

8. a) Derive Hull cut-off magnetic equation and Hull cut-off voltage equation for 8 cavity cylindrical magnetron. 6M
- b) What are the advantages of magnetron over other microwave sources? Mention few applications of magnetron. 6M

UNIT-V

9. a) Write a brief note about RWH theory related to GUNN diode. 6M
- b) Distinguish between Transferred Electron Devices (TEDs) and Avalanche Transit Time Devices (ATDs). 6M

(OR)

10. a) Draw a microwave bench setup to measure the VSWR of a given component. 6M
- b) Draw a microwave bench setup to measure the microwave power using bolometer bridge method. 6M

AR18

CODE: 18CST417

SET-2

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

IV B.Tech I Semester Regular/Supplementary Examinations, November 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 in one place

UNIT-I

1. a) Define UML and explain the importance of modelling with an example 6M
b) Explain in detail about object-oriented modelling 6M
- (OR)
2. a) Explain in detail about UML Architecture with a neat sketch 6M
b) Explain the following i)Generalization ii)Association with an example 6M

UNIT-II

3. a) Summarize the concept of the Use Case diagram and draw a neat diagram for Online Movie Ticket Booking and Write about EXTEND Relationship 6M
b) What is UML Interaction Diagram and what is the notation used 6M
- (OR)
4. a) Outline about Activity Diagram with Notations and symbols 6M
b) Construct a collaboration diagram and list out the notations used 6M

UNIT-III

5. a) Explain in detail the concept of State Machines with a neat sketch 6M
b) Distinguish processes and threads 6M
- (OR)
6. a) Explain in brief about Component Diagram along with the parameters 6M
b) What is the purpose of the Deployment diagram explain the basic elements of the deployment diagram with a neat sketch 6M

UNIT-IV

7. a) Illustrate about types of Design Patterns 6M
b) Write about the objects in small talk MVC in detail 6M
- (OR)
8. a) How can we relate Design patterns to UML 6M
b) What are the Static and dynamic elements in Design Patterns 6M

UNIT-V

9. a) What is the Advantage and Usage of Chain of Responsibility Pattern. 6M
b) Explain Bridge design pattern. 6M
- (OR)
10. a) What are the specifications for the Adapter pattern and list out the Advantages of the Adapter Pattern 6M
b) Explain the details about abstract factory. 6M

AR18

CODE: 18ITT402

SET-2

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

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

SOFTWARE TESTING & PROJECT MANAGEMENT

(Information Technology)

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) Discuss about test factors? 6M
b) Explain about testing tactics checklist? 6M
- (OR)**
2. a) Explain briefly about workbench concept? 6M
b) Differentiate Verification Vs Validation. 6M

UNIT-II

3. a) Explain about CRUD in Software Testing? 6M
b) Explain about Taxonomy of Testing tools? 6M
- (OR)**
4. a) Discuss the Methodology to evaluate automated testing tools, 6M
b) Explain about Win runner and Rational Testing Tools? 6M

UNIT-III

5. a) Explain about Design Phase Testing? 6M
b) Discuss about Testing Security and Testing a Data Warehouse? 6M
- (OR)**
6. a) Explain about Program Phase Testing? 6M
b) Describe about Requirements Phase Testing? 6M

UNIT-IV

7. a) Explain about Late Risk Resolution.? 6M
b) Illustrate about Requirement- Driven Functional Decomposition. 6M
- (OR)**
8. a) Discuss about conventional software Management performance? 6M
b) Explain about pragmatic software cost estimation? 6M

UNIT-V

9. a) Discuss Improving software processes and team effectiveness. 6M
b) Write a short note on the following? 6M
a) improving automation b) peer inspections
- (OR)**
10. a) Discuss in detail Commercial Components 6M
b) Explain about , transitioning to an iterative process. 6M

AR16

CODE: 16CE4026

SET-1

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

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

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) Enumerate the advantages, disadvantages and applications of microwaves? 4M
- b) Derive the wave equations for a TM wave and obtain all the field components in a rectangular waveguide? 10M

(OR)

2. a) Derive the expressions for cut off frequency, phase velocity and group velocity for a rectangular waveguide? 7M
- b) Illustrate in detail about the working principle of cavity resonators? 7M

UNIT-II

3. a) Illustrate in detail about working principle of H plane Tee and derive its S matrix? 7M
- b) Discuss in detail about the working principle of Isolator with relevant diagrams? 7M

(OR)

4. a) Explain in detail about the working principle of directional coupler with neat diagrams? 7M
- b) Illustrate about the working principle of rat race junction and find its S matrix? 7M

UNIT-III

5. a) Illustrate in detail about the limitations of conventional tubes at microwave frequencies? 7M
- b) Derive the expression for output power and efficiency of reflex klystron? 7M

(OR)

6. a) Discuss in detail about the bunching process in two cavity klystron using applegate diagram? 9M
- b) A reflex klystron operates at peak mode of $n=2$ with beam voltage $V_0=300V$, beam current $I_0=20mA$. A signal voltage $V_1=40V$ is applied. Calculate input, output powers and efficiency? 5M

UNIT-IV

7. a) Draw and explain in detail about amplification process in travelling wave tube? 7M
- b) Illustrate the PI mode of operation in magnetron? 7M

(OR)

8. a) Derive the expression for Hull cut off Magnetic field in cylindrical Magnetron? 7M
- b) Distinguish between the TWT and Magnetron with respect to its performance and characteristics? 7M

UNIT-V

9. a) Discuss in detail about the operation of RWH two valley theory with suitable diagrams? 7M
- b) Illustrate in detail about VSWR and Impedance measurement using necessary experimental setup? 7M

(OR)

10. a) Illustrate in detail about the working principle and characteristics of IMPATT diode? 7M
- b) Theorise the significance of each block in microwave bench setup with neat block diagram? 7M