## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Introduction to Data Structures (CSE)*

Time: 3 Hours　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

| | | | |
|---|---|---|---|
| 1. | | With an Example Program Explain the Implementation of Functions in Pointers? | 14M |
| | | (OR) | |
| 2. | (a) | Write a Program to implement concept of STRLEN ( ) ? | 7M |
| | (b) | Describe the different Types of Arrays with Examples? | 7M |

### UNIT – II

| | | | |
|---|---|---|---|
| 3. | (a) | Illustrate the concept of Copying the content of one file to a new file? | 7M |
| | (b) | With an Program to Show working of fprinf ( ) and fscanf( )? | 7M |
| | | (OR) | |
| 4. | | Describe | 14M |
| | | i)Malloc　ii) Calloc　iii) Realloc　iv) Free | |

### UNIT – III

| | | | |
|---|---|---|---|
| 5. | | Explain Abstract Data Type and Describe | 14M |
| | | i) FIFO ADT　　　　　　　　ii) LIFO ADT | |
| | | (OR) | |
| 6. | | Define Queue and Implementation of Queue using Array with an Example Program? | 14M |

### UNIT – IV

| | | | |
|---|---|---|---|
| 7. | | Write a C Program to Implement the Concept to check conditions of Sparse Matrices? | 14M |
| | | (OR) | |
| 8. | | Define Linked list and Explain Different Operations that can be performed on a Linked list with one End? | 14M |

### UNIT-V

| | | | |
|---|---|---|---|
| 9. | (a) | Implement Heap Sort With an Example C Program? | 7M |
| | (b) | Implement Raddix Sort with an Example C Program? | 7M |
| | | (OR) | |
| 10. | (a) | Explain Linear Search with Example? | 7M |
| | (b) | Explain Binary Search with Example? | 7M |

## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
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### All questions carry Equal Marks.

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| | | (OR) | |
| 2. | (a) | Write a Program to implement concept of STRLEN ( ) ? | 7M |
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### UNIT – II

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| | | (OR) | |
| 4. | | Describe | 14M |

i)Malloc　ii) Calloc　iii) Realloc　iv) Free

### UNIT – III

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　i)　FIFO ADT　　　　　　　　　　　ii) LIFO ADT

(OR)

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### UNIT – IV

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### UNIT-V

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## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Electrical Circuits (EEE, ECE)*

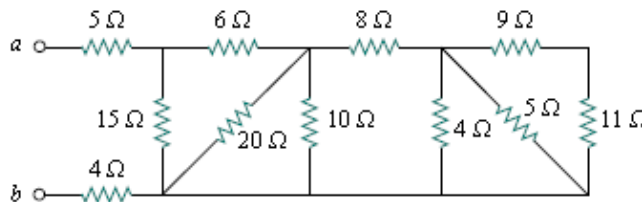Time: 3 Hours                                                                 Max. Marks: 70

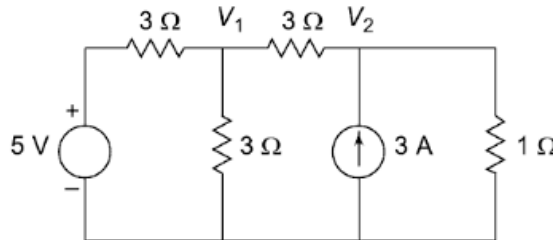**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT – I

1.  (a)  What are the types of sources? Explain them with suitable diagrams and Characteristics?   7M

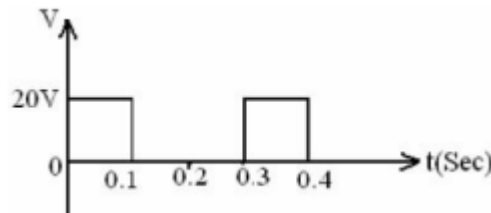    (b)  Determine the equivalent resistance between the terminals a and b of fig.   7M



(OR)

2.  (a)  Derive the expression for Delta connected resistances in terms of Star connected resistances?   7M

    (b)  Using nodal analysis, determine the node voltages in the following network   7M



### UNIT – II

3.  (a)  Compute the RMS and average values of square wave form shown in below figure.   7M



    (b)  Define the following terms:   7M
    i) Impedance          ii) Reactance
    iii) Phase difference      iv) Power factor

(OR)

4.  (a)  Derive an expression for the current, impedance, average power for a series RL circuit excited by a sinusoidally alternating voltage and also find the power factor of the circuit. Draw the phasor diagram.   7M

    (b)  Determine the following parameters of a voltage v = 200 sin314t.   7M
    (i) Frequency      (ii) Form factor      (iii) Crest factor

## UNIT – III

5. (a) Define resonant frequency, Band width, Quality factor and derive the relation among them.  **7M**

   (b) A coil with R = 10 ohm and L = 0.2H is in series with a capacitor of 20μF. Determine resonant frequency, Q factor and bandwidth.  **7M**
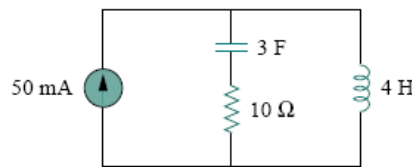
(OR)

6. (a) What is the current locus diagram? Sketch the current locus diagram of series RL circuit as R varies from 0 to Infinity and show that it is a circle.  **7M**

   (b) A voltage V = 50∠0⁰ V is applied to a series circuit consisting of fixed inductive reactance $X_L$ = 5 ohms and a variable resistance R. Sketch the admittance and current locus diagrams.  **7M**

## UNIT – IV

7. (a) What is magnetic coupling? What is its effect? How can you arrange two coils so that they do not have any magnetic coupling  **7M**

   (b) Two coupled coils of L1 = 0.8 H and L2 = 0.2 H have a coupling coefficient k = 0.9. Find the mutual inductance M.  **7M**

(OR)

8. (a) Explain the importance of dot convention in coupled circuits.  **7M**

   (b) What is duality? Draw a dual circuit to the given circuit  **7M**
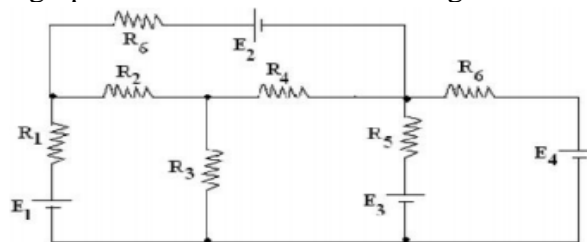


## UNIT-V

9. (a) Define the following and explain by taking an example.  **7M**
   i) Branch          ii) Node          iii) Path
   iv) Sub graph     v) Tree           vi) Degree of a node.

   (b) Draw the oriented graph to the incidence matrix shown below.  **7M**



(OR)
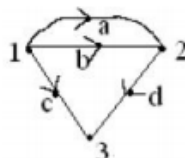
10. (a) Draw the oriented graph of the network shown in figure and write the cutset matrix  **7M**



   (b) For the given graph shown in figure write the tie-set schedule and obtain the relation between branch currents and link currents.  **7M**

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
*SUB: Engineering Drawing - II (CE, ME)*

Time: 3 Hours                                                                       Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

1. A lamp shade is formed by cutting a cone of base 144 mm diameter and 174 mm height   14M
   by a horizontal plane at a distance of 72 mm from the apex and another plane inclined at
   $30^0$ to H.P passing thorough right extreme of the base. Draw the development of the
   shade.

(OR)

2. A pentagonal pyramid, side of base 30 and height 52 stands with its base on H.P with an   14M
   edge of the base parallel to V.P. It is cut by a section plane perpendicular to V.P and
   inclined at $40^0$ to H.P and passing through a point on the axis, 32 above the base. Draw
   the development of the lateral surface of the cut pyramid.

### UNIT – II

3. Draw the view from the front, view from the top and view from the left for figure (1).   14M

(OR)

4. Draw the view from the front, view from the top and view from the right for fig (2).   14M



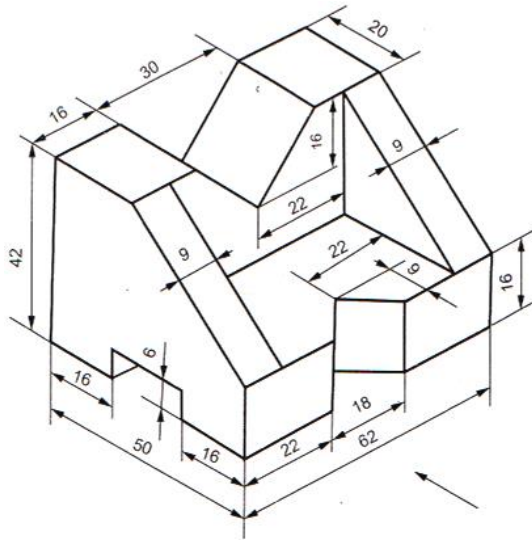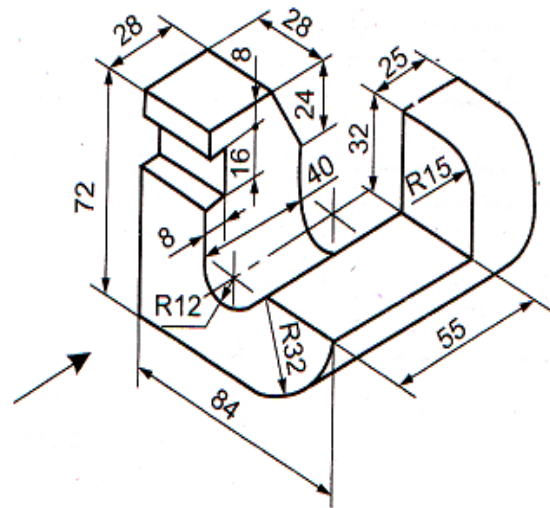**Figure 1**                                        **Figure 2**

### UNIT – III

5. A hemisphere of diameter 44 is nailed on the top face of a frustum of a hexagonal   14M
   pyramid, sides of top and bottom faces being 15 mm and 30 mm respectively and its
   height is 50 mm. The axes of both the solids coincide. Draw the isometric projection.

(OR)

6. Draw an isometric view of the object for the views shown in figure 3.          14M



**Figure 3**

## UNIT – IV

7. A vertical square prism of base side 50 mm is penetrated by a horizontal square prism of base side 40 mm such that their axes intersect. The axis of the horizontal prism is parallel to VP and the faces of both the prisms are equally inclined to VP. Draw the projections of the two prisms, showing the lines of intersection.          14M

(OR)

8. A cylinder of diameter 80 mm and axis 100 mm is completely penetrated horizontally by a cone of diameter 80 mm and axis 120 mm long. Both axes intersect & bisect each other. Draw the projections showing curve of intersections.          14M

## UNIT-V

9. Write the sequence of command steps required to draw the object shown in figure 4 with the help of LINE command using absolute coordinate system.          14M

(OR)

10. Write the sequence of command steps required to draw the object shown in figure 5 with the help of LINE command using relative rectangular coordinate system.          14M



**Figure 4**



**Figure 5**

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
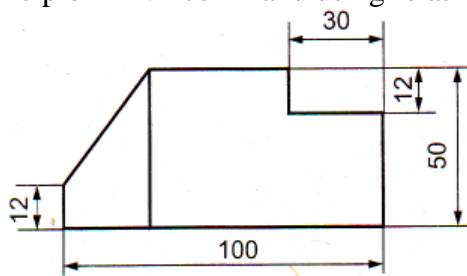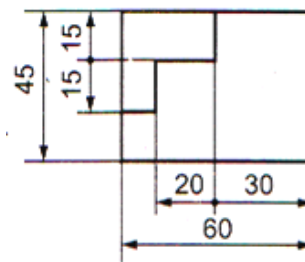*SUB: English – 2 (Common to all branches)*

Time: 3 Hours                                                                 Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

1.  (a) Write an essay on **IPL-2020**.
    (b) What are the qualities needed for writing a good essay?

(OR)

2.  (a) Write the process of preparation of a breakfast item of your choice.
    (b) Transfer the information in the following chart.

**How Students Spend Their Time**



### UNIT – II

3.  (a) Prepare a dialogue of twenty exchanges between a student and the head of the department. The student is irregular to class work and did not submit the Project Work on time. Finally, the student was allowed to write the examinations.
    (b) Apart from language, what are the other qualities needed to prepare a dialogue?

(OR)

4.  (a) Write about the 'pre-interview' Preparations.
    (b) What are the qualities that are expected from a candidate during Job interview

### UNIT – III

5.  (a) What are the differences between a Group Discussion and a Debate?
    (b) Body language plays an important role in Group Discussion. Do you agree?

(OR)

6.  (a) What are the things that are not expected in a fruitful Debate?
    (b) How to prepare for a Debate?

### UNIT – IV

7.  (a) Write about the Parts of a letter.
    (b) Assuming that you are a Doctor, doing service for Corona patients, write a letter to the Chief Minister requesting for more facilities in your hospital.

(OR)

8.  (a) Prepare a speech to be delivered to the students on the eve of sports day in an engineering College. Assume yourself as an Olympic Silver medalist in Boxing and share your experiences, hard work and sacrifice of your parents.

    (b) Explain your views on the statement "Body Language plays an important role while delivering a speech."

## UNIT-V

9.  (a) Assuming that you have completed Post Graduation in Business Administration from a reputed IIM, prepare your CV to be submitted for the post of Asst. Manager in Infosys India.

    (b) Write about the essential parts and manners of an e-mail.

(OR)

10. (a) Correct the following sentences.
       (i)   Sachin Tendulkar is one of the greatest batsman of India.
       (ii)  We did not went to college yesterday because of heavy rain.
       (iii) The dignity of our soldiers are very appreciable.
       (iv)  The people of Punjab prefer Hockey than Cricket.
       (v)   All that glitters are not gold
       (vi)  Mohan Rao speaks best English than Hari.
       (vii) Eating two apples daily are my habit.

    (b) Write a report on setting up of State Bank of India ATM near your house.

### K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Mathematics - 3 (Common to All branches)*

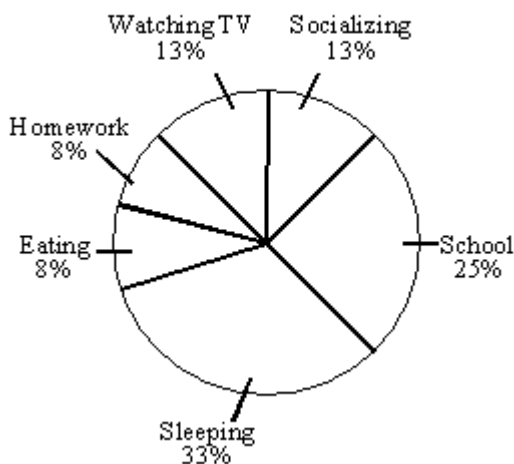Time: 3 Hours                                                                                      Max. Marks: 70

### Answer any FIVE Questions choosing one question from each unit.
### All questions carry Equal Marks.

#### UNIT - I

1. Reduce the following matrix into normal form and hence find its rank.          14M

$$\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

(OR)

2. Find $A^{-1}$ and $A^{-2}$ for the matrix $A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$ by using Cayley-Hamilton theorem.          14M

#### UNIT – II

3. Find a real root of $x \log_{10} x = 1.2$ correct to four decimal places by Newton's method.          14M

(OR)

4. Solve the equations $28x + 4y - z = 32, x + 3y + 10z = 24, 2x + 17y + 4z = 35$ by using Gauss seidel iteration method.          14M

#### UNIT – III

5. Use Lagrange's interpolation formula to find the value of $y$ when $x = 10$, if the following values of $x$ and $y$ are given.          14M

| $x$ | 5 | 6 | 9 | 11 |
|-----|-----|-----|-----|-----|
| $y$ | 12 | 13 | 14 | 16 |

(OR)

6. Find the parabola of the form $y = a + bx + cx^2$ which fits most closely with the observations.          14M

| $x$ | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|-----|-----|-----|-----|-----|-----|-----|-----|
| $y$ | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |

#### UNIT – IV

7. Find $\dfrac{dy}{dx}$ and $\dfrac{d^2 y}{dx^2}$ at $x = 4.0$ for the following data          14M

| $x$ | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|-----|-----|-----|-----|-----|-----|-----|
| $y$ | 3.375 | 7.000 | 13.625 | 24.000 | 38.875 | 59.000 |

(OR)

8. Evaluate $\displaystyle\int_0^6 \dfrac{dx}{1 + x^2}$ by using (i) Trapezoidal rule and (ii) Simpson's $\dfrac{1}{3}$ rule.          14M

#### UNIT-V

9. Using modified Euler's method find an approximate value of $y$ when $x = 0.4$ in step of 0.2, given that $\dfrac{dy}{dx} = y + e^x$ and $y = 0$ when $x = 0$.          14M

(OR)

10. Use Picard's method of approximation to find $y$ when $x = 0.1, 0.2$ given $\dfrac{dy}{dx} = x + y^2$, $y(0) = 0$.          14M

# K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
## B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Environmental Studies (CE, ME)*

Time: 3 Hours                                                          Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

1. (a) Write notes on multidisciplinary nature of environmental studies.                7M
   (b) Define Environment and explain importance of environmental education.             7M

(OR)

2. (a) Write notes on Dams-benefits and problems.                                        7M
   (b) Write notes on effects of modern agriculture on environment.                      7M

### UNIT – II

3.     Give a detailed account of introduction, types, characteristics, features, structure and   14M
       functions of forest ecosystem

(OR)

4. (a) Write notes on Ecological succession                                              7M
   (b) Write notes on energy flow in ecosystem                                           7M

### UNIT – III

5.     What is meant by in- situ and ex-situ conservation of biodiversity? Give examples.   14M

(OR)

6. (a) Discuss the hot spots of biodiversity.                                            7M
   (b) Write notes on Value of biodiversity.                                             7M

### UNIT – IV

7.     Define Air pollution .Give an account of causes and effects of air pollution.    14M
       Enumerate various methods for control of air pollution.

(OR)

8. (a) Write notes on (i) Cyclones   (ii) Earthquake                                     8M
   (b) Role of an individual in prevention of pollution.                                 6M

### UNIT-V

9.     Define climate change. Give a detailed account of global warming, acid rain and   14M
       ozone layer depletion

(OR)

10. (a) Write notes on HIV (or) AIDS.                                                    7M
    (b) Write notes on Women and Child Welfare                                           7M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
*SUB: Programming in C (CE, ME)*

Time: 3 Hours                                                         Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

| | | | |
|---|---|---|---|
| 1. | (a) | What are input and output devices? Explain with examples? | 7M |
| | (b) | Define Datatype? Explain types of Primitive Datatypes with examples? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 2. | (a) | Define Flowchart? Explain the symbols available in Flowchart? | 7M |
| | (b) | Draw a Flowchart for finding whether a number is positive or negative? | 7M |

### UNIT – II

| | | | |
|---|---|---|---|
| 3. | (a) | What is Type Conversion? Explain types of Type Conversions in C? | 7M |
| | (b) | Write a C Program for finding whether a number is Strong Number or not? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 4. | (a) | Define Identifier? Explain identifier rules? | 7M |
| | (b) | Write a C Program to print N Fibonacci Series? | 7M |

### UNIT – III

| | | | |
|---|---|---|---|
| 5. | (a) | What is Switch statement? Write a C program that demonstrates switch? | 7M |
| | (b) | Define Function? Differentiate among Call by Value and Call by Reference? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 6. | (a) | List out Applications of Loops? | 5M |
| | (b) | Write a C Program for swapping three numbers using Call by Value? | 9M |

### UNIT – IV

| | | | |
|---|---|---|---|
| 7. | (a) | Define Array? Explain types of arrays in C? | 7M |
| | (b) | Write a C Program for finding Sum of elements in an arrays? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 8. | (a) | Define String? Explain various String Handling Functions in C with examples? | 7M |
| | (b) | Write a C program to find count of even numbers in an array? | 7M |

### UNIT-V

| | | | |
|---|---|---|---|
| 9. | (a) | Explain in detail about Typedef and Enumerated Datatypes with examples? | 7M |
| | (b) | Define Pointer? Explain Pointer to Pointer. List out the advantages and disadvantages of pointers? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 10. | (a) | Define Structure and Union? Differentiate among them with examples? | 7M |
| | (b) | Define Pointer? Explain declaration and initialization of pointers with examples? | 7M |

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
*SUB: Mathematics – II (CE, ME)*

Time: 3 Hours                                           Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

**UNIT - I**

1. (a) Find a unit vector normal to the surface $x^3 + y^3 + 3xyz = 3$ at the point (1,2,-1)    6M

   (b) Show that $div(gradr^n) = n(n+1)r^{n-2}$    8M

(OR)

2. Verify Green's theorem for $\int_c \left[ (xy + y^2)dx + x^2dy \right]$, where c is bounded by $y = x$ and    14M

   $y = x^2$

**UNIT – II**

3. (a) Calculate $L\left[ t^2 e^{-2t} \cos t \right]$    7 M

   (b) Find $L\left( \dfrac{\cos 2t}{t} \right)$    7 M

(OR)

4. (a) Find the Laplace Transform of the function $f(t) = \begin{cases} \sin wt, \ 0 < t < \dfrac{\pi}{w} \\ 0 \qquad , \dfrac{\pi}{w} < t < \dfrac{2\pi}{w} \end{cases}$    8M

   (b) Find $L\left\{ \int_0^t te^{-t} \sin 4t \, dt \right\}$    6M

**UNIT – III**

5. (a) Find the inverse Laplace Transform of $L^{-1}\left( \dfrac{2s^2 - 4}{(s+1)(s-2)(s-3)} \right)$    7M

   (b) Apply convolution theorem to evaluate $L^{-1}\left[ \dfrac{s^2}{(s^2 + a^2)^2} \right]$    7M

(OR)

6. Solve $\left( D^3 - 3D^2 + 3D - 1 \right)y = t^2 e^t$ given that $y(0) = 1$, $y'(0) = 0$, $y''(0) = -2$.    14M

**UNIT – IV**

7. Obtain a Fourier series to represent $x - x^2$ from $x = -\pi$ to $x = \pi$    14M

(OR)

8. Represent the following function by a Fourier sine series    14M

   $f(x) = \begin{cases} 1 \ when \ 0 < x < \dfrac{l}{2} \\ 0 \ when \dfrac{l}{2} < x < l \end{cases}$

## UNIT-V

9. (a) Form the PDE by eliminating the arbitrary functions from $z = f(x+3t) + g(x-3t)$       7M

(b) Using the method of separation of the variables, solve $\dfrac{\partial u}{\partial x} = 2\dfrac{\partial u}{\partial t} + u = 2 + u$, where       7M

$u(x,0) = 6e^{-3x}$

(OR)

10. A rod of length $l$ with insulated sides is initially at a uniform temperature $u_0$ . Its ends       14M
are suddenly cooled to $0^0c$ and are kept at that temperature. Find the temperature
function $u(x,t)$

## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
*SUB: Human Values and Professional Ethics (EEE, ECE & CSE)*

Time: 3 Hours                                                                          Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I
1. (a) How different are personal ethics from professional ethics?
   (b) Where and How do moral problems arise in Engineering?

(OR)

2. (a) What is Moral Autonomy?
   (b) Write in detail about professional ideals and virtues.

### UNIT – II
3. (a) What can happen if you break ethics as an engineer?
   (b) Do engineers have a code of ethics?

(OR)

4. (a) What are the ethical issues in engineering?
   (b) Explain the five codes of ethics?

### UNIT – III
5. (a) How will an engineer assess the safety?
   (b) What are the duties and responsibilities of a safety Engineer?

(OR)

6. (a) Write about the Chernobyl disaster.
   (b) Are the engineers responsible to educate the public for safe operation of the equipment? How?

### UNIT – IV
7. (a) How does engineering affect the economy?
   (b) How do engineers impact our lives?

(OR)

8. (a) How can Confidentiality be maintained?
   (b) Write a detailed note on Employee rights.

### UNIT-V
9. (a) Write a detailed note on Environmental Ethics.
   (b) Do engineers become good managers?

(OR)

10. (a) Define Computer Ethics and why are they important?
    (b) What are the types of computer ethics?

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
*SUB: Engineering Chemistry (EEE, ECE & CSE)*

Time: 3 Hours                                         Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

**UNIT - I**

1. Write the structure of EDTA and describe the estimation of hardness by EDTA method. 14M

(OR)

2. (a) i) Priming &Foaming                    ii) Scale & Sludge                    8M
   (b) Define hardness and explain units of hardness                               6M

**UNIT – II**

3. (a) Write a short note on   Vulcanization of rubber                            7M
   (b) Write a short note on   Compounding of rubber                              7M

(OR)

4. (a) Write a short note on addition polymerization with examples.              7M
   (b) Preparation, properties and applications of Nylon-6,6.                    7M

**UNIT – III**

5. (a) Write notes on $H_2$-$O_2$-fuel cell  with neat diagram                   7M
   (b) Explain Electro chemical cell with neat diagram.                          7M

(OR)

6. Give an account of the various factors influencing the rate of corrosion by giving   14M
   suitable examples.

**UNIT – IV**

7. What do you mean by refining of petroleum? List out the various fractions obtained   14M
   during refining of crude oil with neat diagram

(OR)

8. (a) Define the lubricant & explain the functions of lubricants                 7M
   (b) Discuss in detail about Fischer – Tropsch process for the manufacture of synthetic petrol   7M

**UNIT-V**

9. (a) Define Green chemistry and explain the significance of Green chemistry     5M
   (b) Write a short note on  i) Fluorescence    ii) Solar cells                  9M

(OR)

10. (a) Define catalyst. Explain types of catalysis and its applications.         9M
    (b) Write a short note on phosphorescence.                                    5M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
*SUB: Engineering Physics (EEE, ECE & CSE)*

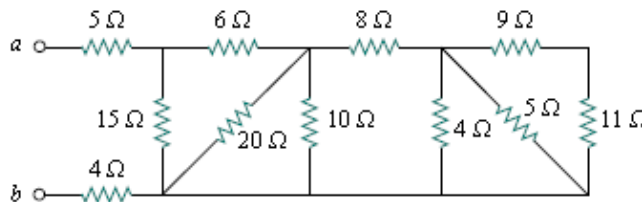Time: 3 Hours                                                          Max. Marks: 70

Answer any FIVE Questions choosing one question from each unit.
All questions carry Equal Marks.

**UNIT - I**

1.  (a) What is a plane diffraction grating? Explain the experimental method to determine the wavelength of spectral lines using grating.                                    8M
    (b) List out any three of each Medical and Industrial applications of Lasers.        6M
                                        (OR)
2.  (a) Explain the classification of Optical fibres based on (i) refractive index profile (ii) Modes of propagation.                                                        10M
    (b) Distinguish Spontaneous Emission and Stimulated Emission.                       4M

**UNIT – II**

3.  (a) What is Bragg's Law?  Derive Bragg's equation.                                  10M
    (b) Draw the Miller planes for the Miller indices (i) (2 1 2)   (ii) (1 1 1)        4M
                                        (OR)
4.  (a) Write any five properties of Ultrasonics. Explain how Ultrasonics are used to detect the flaws in a body using Non-destructive testing.                             10M
    (b) An ultrasonic generator has a quartz crystal whose thickness is 0.7 mm, density is 2800 $kgm^{-3}$ and Young's modulus is $8.8 \times 10^{10}$ $Nm^{-2}$. Find the fundamental frequency of the generator.                                                                     4M

**UNIT – III**

5.  (a) Derive an expression for the energy of an electron in one dimensional infinite potential well of length L.                                                                    10M
    (b) Explain the physical significance of wave function.                             4M
                                        (OR)
6.  (a) What is the Band theory of Solids?  Explain the classification of solids, based on band theory.                                                                          10M
    (b) Derive an equation for the electrical conductivity of a metal.                  4M

**UNIT – IV**

7.  (a) Differentiate the Hard and Soft magnetic materials? Give any two examples for each and write any four applications.                                                        10M
    (b) A magnetic material has a magnetization of 2300 A $m^{-1}$ and produces a flux density of 0.00314 Wb $m^{-2}$. Calculate the magnetizing for and the relative permeability of the material.                                                                           4M
                                        (OR)
8.  (a) Differentiate the Type-I and Type-II Superconductors?  Give two examples for each.  Give any six applications of Superconductors.                                       10M
    (b) How can you justify that Superconductors behave like Diamagnetic materials.     4M

**UNIT-V**

9.  (a) What is Hall effect?  Derive an expression for Hall coefficient for p-type semi-conductors.  8M
    (b) Write a short notes on types of Extrinsic Semiconductors.                       6M
                                        (OR)
10. (a) What are Nano materials?  Explain the principal factors which makes them different from that of Bulk materials                                                              8M
    (b) List any six applications of nanomaterials in different fields.                 6M

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
*SUB: Electrical Circuits (EEE, ECE)*

Time: 3 Hours          Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
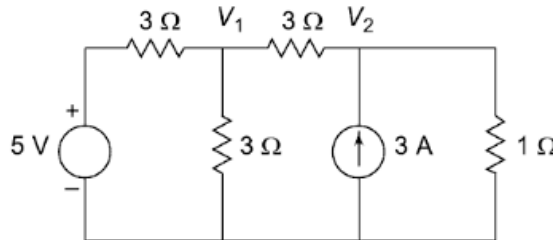**All questions carry Equal Marks.**

### UNIT – I

1. (a) What are the types of sources? Explain them with suitable diagrams and Characteristics?    7M

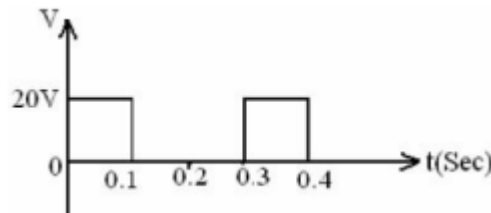   (b) Determine the equivalent resistance between the terminals a and b of fig.    7M



(OR)

2. (a) Derive the expression for Delta connected resistances in terms of Star connected resistances?    7M

   (b) Using nodal analysis, determine the node voltages in the following network    7M



### UNIT – II

3. (a) Compute the RMS and average values of square wave form shown in below figure.    7M



   (b) Define the following terms:    7M
   i) Impedance        ii) Reactance
   iii) Phase difference    iv) Power factor

(OR)

4. (a) Derive an expression for the current, impedance, average power for a series RL circuit excited by a sinusoidally alternating voltage and also find the power factor of the circuit. Draw the phasor diagram.    7M

   (b) Determine the following parameters of a voltage v = 200 sin314t.    7M
   (i) Frequency     (ii) Form factor     (iii) Crest factor

## UNIT – III

5.  (a)  Define resonant frequency, Band width, Quality factor and derive the relation among them.  7M

    (b)  A coil with R = 10 ohm and L = 0.2H is in series with a capacitor of 20μF. Determine resonant frequency, Q factor and bandwidth.  7M
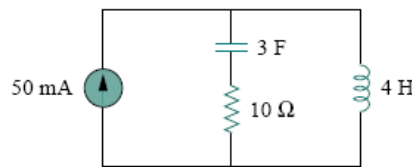
(OR)

6.  (a)  What is the current locus diagram? Sketch the current locus diagram of series RL circuit as R varies from 0 to Infinity and show that it is a circle.  7M

    (b)  A voltage $V = 50\angle0^0$ V is applied to a series circuit consisting of fixed inductive reactance $X_L$ = 5 ohms and a variable resistance R. Sketch the admittance and current locus diagrams.  7M

## UNIT – IV

7.  (a)  What is magnetic coupling? What is its effect? How can you arrange two coils so that they do not have any magnetic coupling  7M

    (b)  Two coupled coils of L1 = 0.8 H and L2 = 0.2 H have a coupling coefficient k = 0.9. Find the mutual inductance M.  7M

(OR)

8.  (a)  Explain the importance of dot convention in coupled circuits.  7M

    (b)  What is duality? Draw a dual circuit to the given circuit  7M
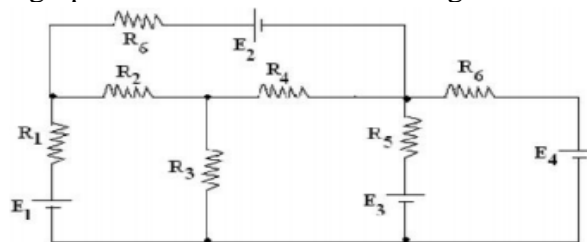


## UNIT-V

9.  (a)  Define the following and explain by taking an example.  7M
       i) Branch        ii) Node        iii) Path
       iv) Sub graph    v) Tree         vi) Degree of a node.

    (b)  Draw the oriented graph to the incidence matrix shown below.  7M



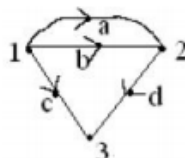(OR)

10.  (a)  Draw the oriented graph of the network shown in figure and write the cutset matrix  7M



    (b)  For the given graph shown in figure write the tie-set schedule and obtain the relation between branch currents and link currents.  7M

## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Engineering Drawing - II (CE, ME)*

Time: 3 Hours                                                                      Max. Marks: 70

### Answer any FIVE Questions choosing one question from each unit.
### All questions carry Equal Marks.

### UNIT - I

1. A lamp shade is formed by cutting a cone of base 144 mm diameter and 174 mm height   14M
   by a horizontal plane at a distance of 72 mm from the apex and another plane inclined at
   $30^0$ to H.P passing thorough right extreme of the base. Draw the development of the
   shade.

(OR)

2. A pentagonal pyramid, side of base 30 and height 52 stands with its base on H.P with an   14M
   edge of the base parallel to V.P. It is cut by a section plane perpendicular to V.P and
   inclined at $40^0$ to H.P and passing through a point on the axis, 32 above the base. Draw
   the development of the lateral surface of the cut pyramid.

### UNIT – II

3. Draw the view from the front, view from the top and view from the left for figure (1).   14M

(OR)

4. Draw the view from the front, view from the top and view from the right for fig (2).   14M



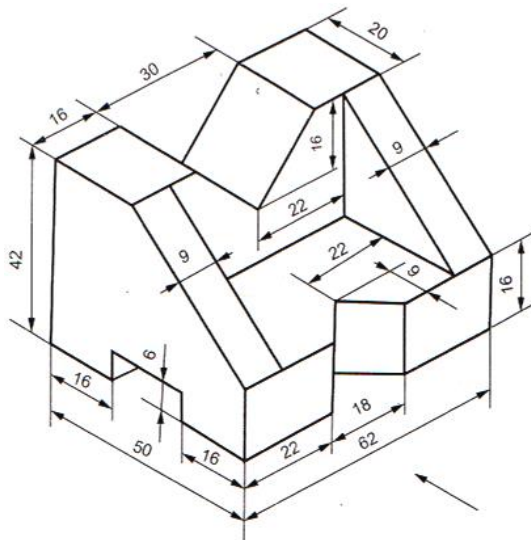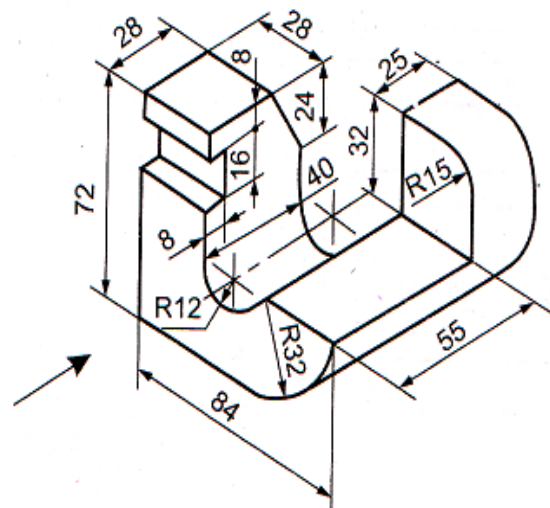**Figure 1**                                        **Figure 2**

### UNIT – III

5. A hemisphere of diameter 44 is nailed on the top face of a frustum of a hexagonal   14M
   pyramid, sides of top and bottom faces being 15 mm and 30 mm respectively and its
   height is 50 mm. The axes of both the solids coincide. Draw the isometric projection.

(OR)

6. Draw an isometric view of the object for the views shown in figure 3.     14M



**Figure 3**

## UNIT – IV

7. A vertical square prism of base side 50 mm is penetrated by a horizontal square prism of base side 40 mm such that their axes intersect. The axis of the horizontal prism is parallel to VP and the faces of both the prisms are equally inclined to VP. Draw the projections of the two prisms, showing the lines of intersection.     14M

(OR)

8. A cylinder of diameter 80 mm and axis 100 mm is completely penetrated horizontally by a cone of diameter 80 mm and axis 120 mm long. Both axes intersect & bisect each other. Draw the projections showing curve of intersections.     14M

## UNIT-V

9. Write the sequence of command steps required to draw the object shown in figure 4 with the help of LINE command using absolute coordinate system.     14M

(OR)

10. Write the sequence of command steps required to draw the object shown in figure 5 with the help of LINE command using relative rectangular coordinate system.     14M



**Figure 4**          **Figure 5**

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
*SUB: English – 2 (Common to all branches)*

Time: 3 Hours                                                        Max. Marks: 70
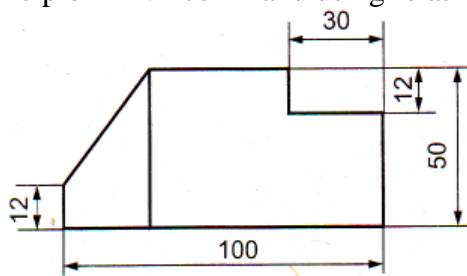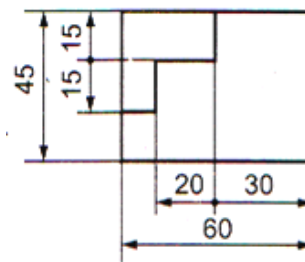
**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

1. (a) Write an essay on **IPL-2020**.
   (b) What are the qualities needed for writing a good essay?

(OR)

2. (a) Write the process of preparation of a breakfast item of your choice.
   (b) Transfer the information in the following chart.



**How Students Spend Their Time**

WatchingTV 13%
Socializing 13%
Homework 8%
Eating 8%
School 25%
Sleeping 33%

### UNIT – II

3. (a) Prepare a dialogue of twenty exchanges between a student and the head of the department. The student is irregular to class work and did not submit the Project Work on time. Finally, the student was allowed to write the examinations.
   (b) Apart from language, what are the other qualities needed to prepare a dialogue?

(OR)

4. (a) Write about the 'pre-interview' Preparations.
   (b) What are the qualities that are expected from a candidate during Job interview

### UNIT – III

5. (a) What are the differences between a Group Discussion and a Debate?
   (b) Body language plays an important role in Group Discussion. Do you agree?

(OR)

6. (a) What are the things that are not expected in a fruitful Debate?
   (b) How to prepare for a Debate?

### UNIT – IV

7. (a) Write about the Parts of a letter.
   (b) Assuming that you are a Doctor, doing service for Corona patients, write a letter to the Chief Minister requesting for more facilities in your hospital.

(OR)

8. (a) Prepare a speech to be delivered to the students on the eve of sports day in an engineering College. Assume yourself as an Olympic Silver medalist in Boxing and share your experiences, hard work and sacrifice of your parents.

   (b) Explain your views on the statement "Body Language plays an important role while delivering a speech."

## UNIT-V

9. (a) Assuming that you have completed Post Graduation in Business Administration from a reputed IIM, prepare your CV to be submitted for the post of Asst. Manager in Infosys India.

   (b) Write about the essential parts and manners of an e-mail.

(OR)

10. (a) Correct the following sentences.
    (i) Sachin Tendulkar is one of the greatest batsman of India.
    (ii) We did not went to college yesterday because of heavy rain.
    (iii) The dignity of our soldiers are very appreciable.
    (iv) The people of Punjab prefer Hockey than Cricket.
    (v) All that glitters are not gold
    (vi) Mohan Rao speaks best English than Hari.
    (vii) Eating two apples daily are my habit.

    (b) Write a report on setting up of State Bank of India ATM near your house.

# K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
## B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Mathematics - 3 (Common to All branches)*
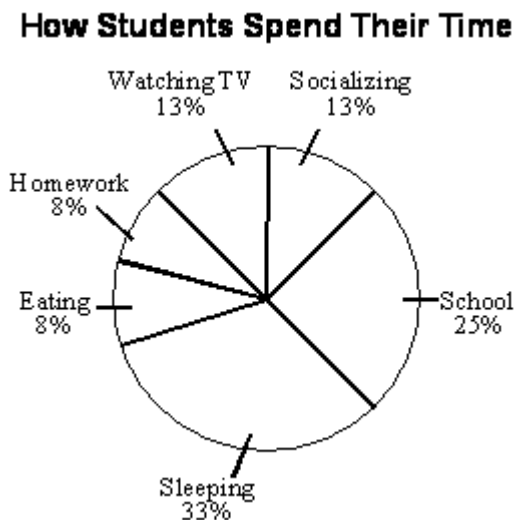
Time: 3 Hours          Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

1. Reduce the following matrix into normal form and hence find its rank.    14M

$$\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

(OR)

2. Find $A^{-1}$ and $A^{-2}$ for the matrix $A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$ by using Cayley-Hamilton theorem.    14M

### UNIT – II

3. Find a real root of $x \log_{10} x = 1.2$ correct to four decimal places by Newton's method.    14M

(OR)

4. Solve the equations $28x + 4y - z = 32,\ x + 3y + 10z = 24,\ 2x + 17y + 4z = 35$ by using Gauss seidel iteration method.    14M

### UNIT – III

5. Use Lagrange's interpolation formula to find the value of $y$ when $x = 10$, if the following values of $x$ and $y$ are given.    14M

| $x$ | 5 | 6 | 9 | 11 |
|-----|----|----|----|----|
| $y$ | 12 | 13 | 14 | 16 |

(OR)

6. Find the parabola of the form $y = a + bx + cx^2$ which fits most closely with the observations.    14M

| $x$ | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|-----|-----|-----|-----|-----|-----|-----|-----|
| $y$ | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |

### UNIT – IV

7. Find $\dfrac{dy}{dx}$ and $\dfrac{d^2 y}{dx^2}$ at $x = 4.0$ for the following data    14M

| $x$ | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|-----|-------|-------|--------|--------|--------|--------|
| $y$ | 3.375 | 7.000 | 13.625 | 24.000 | 38.875 | 59.000 |

(OR)

8. Evaluate $\displaystyle\int_{0}^{6} \dfrac{dx}{1 + x^2}$ by using (i) Trapezoidal rule and (ii) Simpson's $\dfrac{1}{3}$ rule.    14M

### UNIT-V

9. Using modified Euler's method find an approximate value of $y$ when $x = 0.4$ in step of 0.2, given that $\dfrac{dy}{dx} = y + e^x$ and $y = 0$ when $x = 0$.    14M

(OR)

10. Use Picard's method of approximation to find $y$ when $x = 0.1, 0.2$ given $\dfrac{dy}{dx} = x + y^2$, $y(0) = 0$.    14M

## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Environmental Studies (CE, ME)*

Time: 3 Hours　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

### Answer any FIVE Questions choosing one question from each unit.
### All questions carry Equal Marks.

### UNIT - I

1. (a) Write notes on multidisciplinary nature of environmental studies.　　7M
   (b) Define Environment and explain importance of environmental education.　　7M

(OR)

2. (a) Write notes on Dams-benefits and problems.　　7M
   (b) Write notes on effects of modern agriculture on environment.　　7M

### UNIT – II

3. Give a detailed account of introduction, types, characteristics, features, structure and functions of forest ecosystem　　14M

(OR)

4. (a) Write notes on Ecological succession　　7M
   (b) Write notes on energy flow in ecosystem　　7M

### UNIT – III

5. What is meant by in- situ and ex-situ conservation of biodiversity? Give examples.　　14M

(OR)

6. (a) Discuss the hot spots of biodiversity.　　7M
   (b) Write notes on Value of biodiversity.　　7M

### UNIT – IV

7. Define Air pollution .Give an account of causes and effects of air pollution. Enumerate various methods for control of air pollution.　　14M

(OR)

8. (a) Write notes on (i) Cyclones (ii) Earthquake　　8M
   (b) Role of an individual in prevention of pollution.　　6M

### UNIT-V

9. Define climate change. Give a detailed account of global warming, acid rain and ozone layer depletion　　14M

(OR)

10. (a) Write notes on HIV (or) AIDS.　　7M
    (b) Write notes on Women and Child Welfare　　7M

## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Programming in C (CE, ME)*

Time: 3 Hours          Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

| | | | |
|---|---|---|---|
| 1. | (a) | What are input and output devices? Explain with examples? | 7M |
| | (b) | Define Datatype? Explain types of Primitive Datatypes with examples? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 2. | (a) | Define Flowchart? Explain the symbols available in Flowchart? | 7M |
| | (b) | Draw a Flowchart for finding whether a number is positive or negative? | 7M |

### UNIT – II

| | | | |
|---|---|---|---|
| 3. | (a) | What is Type Conversion? Explain types of Type Conversions in C? | 7M |
| | (b) | Write a C Program for finding whether a number is Strong Number or not? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 4. | (a) | Define Identifier? Explain identifier rules? | 7M |
| | (b) | Write a C Program to print N Fibonacci Series? | 7M |

### UNIT – III

| | | | |
|---|---|---|---|
| 5. | (a) | What is Switch statement? Write a C program that demonstrates switch? | 7M |
| | (b) | Define Function? Differentiate among Call by Value and Call by Reference? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 6. | (a) | List out Applications of Loops? | 5M |
| | (b) | Write a C Program for swapping three numbers using Call by Value? | 9M |

### UNIT – IV

| | | | |
|---|---|---|---|
| 7. | (a) | Define Array? Explain types of arrays in C? | 7M |
| | (b) | Write a C Program for finding Sum of elements in an arrays? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 8. | (a) | Define String? Explain various String Handling Functions in C with examples? | 7M |
| | (b) | Write a C program to find count of even numbers in an array? | 7M |

### UNIT-V

| | | | |
|---|---|---|---|
| 9. | (a) | Explain in detail about Typedef and Enumerated Datatypes with examples? | 7M |
| | (b) | Define Pointer? Explain Pointer to Pointer. List out the advantages and disadvantages of pointers? | 7M |

(OR)

| | | | |
|---|---|---|---|
| 10. | (a) | Define Structure and Union? Differentiate among them with examples? | 7M |
| | (b) | Define Pointer? Explain declaration and initialization of pointers with examples? | 7M |

## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Mathematics – II (CE, ME)*

Time: 3 Hours                                                                Max. Marks: 70

### Answer any FIVE Questions choosing one question from each unit.
### All questions carry Equal Marks.

### UNIT - I

1. (a) Find a unit vector normal to the surface $x^3 + y^3 + 3xyz = 3$ at the point (1,2,-1)        6M

   (b) Show that $div(grad\, r^n) = n(n+1)r^{n-2}$        8M

(OR)

2. Verify Green's theorem for $\int_c \left[ (xy + y^2)dx + x^2 dy \right]$, where c is bounded by $y = x$ and $y = x^2$        14M

### UNIT – II

3. (a) Calculate $L\left[ t^2 e^{-2t} \cos t \right]$        7 M

   (b) Find $L\left( \dfrac{\cos 2t}{t} \right)$        7 M

(OR)

4. (a) Find the Laplace Transform of the function $f(t) = \begin{cases} \sin wt, & 0 < t < \dfrac{\pi}{w} \\ 0 & , \dfrac{\pi}{w} < t < \dfrac{2\pi}{w} \end{cases}$        8M

   (b) Find $L\left\{ \displaystyle\int_0^t te^{-t} \sin 4t \, dt \right\}$        6M

### UNIT – III

5. (a) Find the inverse Laplace Transform of $L^{-1}\left( \dfrac{2s^2 - 4}{(s+1)(s-2)(s-3)} \right)$        7M

   (b) Apply convolution theorem to evaluate $L^{-1}\left[ \dfrac{s^2}{(s^2 + a^2)^2} \right]$        7M

(OR)

6. Solve $\left( D^3 - 3D^2 + 3D - 1 \right)y = t^2 e^t$ given that $y(0)=1, y'(0)=0, y''(0) = -2$.        14M

### UNIT – IV

7. Obtain a Fourier series to represent $x - x^2$ from $x = -\pi$ to $x = \pi$        14M

(OR)

8. Represent the following function by a Fourier sine series        14M

$f(x) = \begin{cases} 1 \; when \; 0 < x < \dfrac{l}{2} \\ 0 \; when \; \dfrac{l}{2} < x < l \end{cases}$

**UNIT-V**

9.   (a)   Form the PDE by eliminating the arbitrary functions from $z = f(x+3t) + g(x-3t)$     7M

      (b)   Using the method of separation of the variables, solve $\dfrac{\partial u}{\partial x} = 2\dfrac{\partial u}{\partial t} + u = 2 + u$, where     7M

        $u(x,0) = 6e^{-3x}$

<div align="center">(OR)</div>

10.       A rod of length $l$ with insulated sides is initially at a uniform temperature $u_0$ . Its ends     14M
               are suddenly cooled to $0^0 c$ and are kept at that temperature. Find the temperature
               function $u(x,t)$

## K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
### B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
*SUB: Human Values and Professional Ethics (EEE, ECE & CSE)*

Time: 3 Hours                                                      Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I
1. (a) How different are personal ethics from professional ethics?
   (b) Where and How do moral problems arise in Engineering?

(OR)

2. (a) What is Moral Autonomy?
   (b) Write in detail about professional ideals and virtues.

### UNIT – II
3. (a) What can happen if you break ethics as an engineer?
   (b) Do engineers have a code of ethics?

(OR)

4. (a) What are the ethical issues in engineering?
   (b) Explain the five codes of ethics?

### UNIT – III
5. (a) How will an engineer assess the safety?
   (b) What are the duties and responsibilities of a safety Engineer?

(OR)

6. (a) Write about the Chernobyl disaster.
   (b) Are the engineers responsible to educate the public for safe operation of the equipment? How?

### UNIT – IV
7. (a) How does engineering affect the economy?
   (b) How do engineers impact our lives?

(OR)

8. (a) How can Confidentiality be maintained?
   (b) Write a detailed note on Employee rights.

### UNIT-V
9. (a) Write a detailed note on Environmental Ethics.
   (b) Do engineers become good managers?

(OR)

10. (a) Define Computer Ethics and why are they important?
    (b) What are the types of computer ethics?

**K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA**
**B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021**
*SUB: Engineering Chemistry (EEE, ECE & CSE)*

Time: 3 Hours                                                                 Max. Marks: 70

**Answer any FIVE Questions choosing one question from each unit.**
**All questions carry Equal Marks.**

### UNIT - I

1. Write the structure of EDTA and describe the estimation of hardness by EDTA method. 14M

(OR)

2. (a) i) Priming &Foaming                    ii) Scale & Sludge                    8M

   (b) Define hardness and explain units of hardness                    6M

### UNIT – II

3. (a) Write a short note on   Vulcanization of rubber                    7M

   (b) Write a short note on   Compounding of rubber                    7M

(OR)

4. (a) Write a short note on addition polymerization with examples.                    7M

   (b) Preparation, properties and applications of Nylon-6,6.                    7M

### UNIT – III

5. (a) Write notes on $H_2$-$O_2$-fuel cell  with neat diagram                    7M

   (b) Explain Electro chemical cell with neat diagram.                    7M

(OR)

6. Give an account of the various factors influencing the rate of corrosion by giving suitable examples.                    14M

### UNIT – IV

7. What do you mean by refining of petroleum? List out the various fractions obtained during refining of crude oil with neat diagram                    14M

(OR)

8. (a) Define the lubricant & explain the functions of lubricants                    7M

   (b) Discuss in detail about Fischer – Tropsch process for the manufacture of synthetic petrol                    7M

### UNIT-V

9. (a) Define Green chemistry and explain the significance of Green chemistry                    5M

   (b) Write a short note on  i) Fluorescence    ii) Solar cells                    9M

(OR)

10. (a) Define catalyst. Explain types of catalysis and its applications.                    9M

    (b) Write a short note on phosphorescence.                    5M

# K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
## B. Tech. II Sem. (R15) Supplementary Examinations of March – 2021
### *SUB: Engineering Physics (EEE, ECE & CSE)*

Time: 3 Hours                                                                                      Max. Marks: 70

Answer any FIVE Questions choosing one question from each unit.
All questions carry Equal Marks.

**UNIT - I**

1. (a) What is a plane diffraction grating? Explain the experimental method to determine the wavelength of spectral lines using grating.                                          8M
   (b) List out any three of each Medical and Industrial applications of Lasers.          6M

(OR)

2. (a) Explain the classification of Optical fibres based on (i) refractive index profile (ii) Modes of propagation.                                                                   10M
   (b) Distinguish Spontaneous Emission and Stimulated Emission.                          4M

**UNIT – II**

3. (a) What is Bragg's Law? Derive Bragg's equation.                                      10M
   (b) Draw the Miller planes for the Miller indices (i) (2 1 2)   (ii) (1 1 1)          4M

(OR)

4. (a) Write any five properties of Ultrasonics. Explain how Ultrasonics are used to detect the flaws in a body using Non-destructive testing.                                        10M
   (b) An ultrasonic generator has a quartz crystal whose thickness is 0.7 mm, density is 2800 $kgm^{-3}$ and Young's modulus is $8.8 \times 10^{10}$ $Nm^{-2}$. Find the fundamental frequency of the generator.                                                                            4M

**UNIT – III**

5. (a) Derive an expression for the energy of an electron in one dimensional infinite potential well of length L.                                                                       10M
   (b) Explain the physical significance of wave function.                                4M

(OR)

6. (a) What is the Band theory of Solids? Explain the classification of solids, based on band theory.                                                                                   10M
   (b) Derive an equation for the electrical conductivity of a metal.                     4M

**UNIT – IV**

7. (a) Differentiate the Hard and Soft magnetic materials? Give any two examples for each and write any four applications.                                                             10M
   (b) A magnetic material has a magnetization of 2300 A $m^{-1}$ and produces a flux density of 0.00314 Wb $m^{-2}$. Calculate the magnetizing for and the relative permeability of the material.                                                                                        4M

(OR)

8. (a) Differentiate the Type-I and Type-II Superconductors? Give two examples for each. Give any six applications of Superconductors.                                              10M
   (b) How can you justify that Superconductors behave like Diamagnetic materials.       4M

**UNIT-V**

9. (a) What is Hall effect? Derive an expression for Hall coefficient for p-type semi-conductors.  8M
   (b) Write a short notes on types of Extrinsic Semiconductors.                          6M

(OR)

10. (a) What are Nano materials? Explain the principal factors which makes them different from that of Bulk materials                                                                    8M
    (b) List any six applications of nanomaterials in different fields.                   6M