Q.P. Code: 916012 | **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. II Sem (R15) Supple. Examinations of November 2019
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.	(a)	Write a Program using pointer to determine length of a given string?	7M
	(b)	Explain in detail about Pointer implementation in one dimensional Array?	7M
		(OR)	
2.		Explain in detail about Passing pointers to Functions in C with example?	14M

UNIT – II

3.	(a)	Write a C Program to copy content of one File into another File ?	7M
	(b)	Write a C Program to Print names of all Files present in a Directory?	7M
		(OR)	
4.		Write a C Program to represent Dynamic Memory Allocation?	14M

UNIT – III

5.		Differentiate Linear and Non-linear Data structures with Examples?	14M
		(OR)	
6.		Define Stack and explain the implementation of stack using array with a c program?	14M

UNIT – IV

7.		Write a program that will convert 2D-representation to Sparse representation?	14M
		(OR)	
8.		Explain the following operations that are performed on single linked lists. i) Insertion ii) Deletion	14M

UNIT-V

9.		Explain with an example about i) Bubble sort ii) insertion sorting	14M
		(OR)	
10.		Differentiate linear search vs binary search with an example program for each?	14M

Q.P. Code: 916212 | **SET - 2**

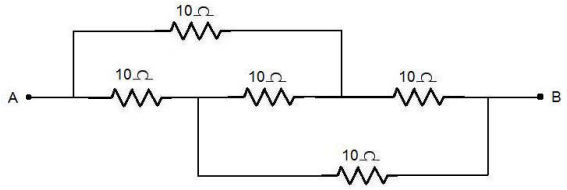
K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. II Sem (R15) Supple. Examinations of November 2019
SUB: ELECTRICAL CIRCUITS (Common to EEE & ECE)

Time : 3 Hours | Max. Marks: 70

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

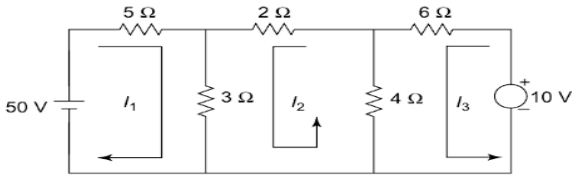
UNIT - I

1. (a) Discuss about voltage and current division principles. 7M
   (b) Calculate the resistance between the terminals A – B. 7M



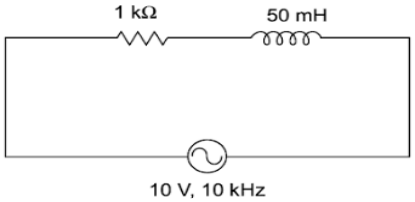
(OR)

2. (a) Explain source transformation and how can it be used to convert 7M
   (i) a practical voltage source into a practical current source;
   (ii) a practical current source into a practical voltage source
   (b) Determine the power dissipation in 4Ω resistor of the circuit shown in the fig. using mesh analysis. 7M



UNIT – II

3. (a) Derive the equation of average value and RMS value of sinusoidal waveform. 7M
   (b) To the circuit shown in fig. consisting of a 1k ohm resistor connected in series with a 50mH coil, a 10V rms, 10KHz signal is applied. Find i) impedance Z, ii) current I, iii) Phase angle (θ) & iv) Voltage across R & L. 7M

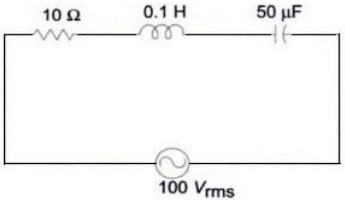


(OR)

4. (a) Determine the following parameters of a voltage v = 200 sin314t. 7M
   (i) Frequency (ii) Form factor (iii) Crest factor
   (b) Illustrate the terms 7M
   i) Active Power ii) Reactive Power iii) Apparent Power iv) Power factor

UNIT – III

5. (a) Obtain the expression for resonant frequency, bandwidth and Q-factor for parallel RLC circuit. 7M
   (b) For the circuit shown in the fig., determine the frequency at which the circuit resonates. Also find the voltage across the inductance at resonance and the Q factor of the circuit. 7M



(OR)

6. (a) Explain the procedure to draw the locus diagram of RC series circuit when 'C' is varying. 7M

(b) A voltage V = $50\angle 0^0$ 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

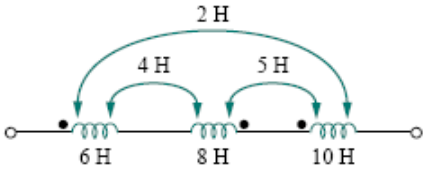
7. (a) Derive the relation between self inductance, mutual inductance and coefficient of coupling. 7M

(b) Coils A and B are magnetically coupled. Coil A has a self inductance of 0.30 H and 300 turns, and coil B has a self inductance of 0.20 H and 120 turns. A change of flux of 8 mWb occurs in coil B when a current of 3 A is reversed in coil A. Determine 7M
(i) the mutual inductance between the coils, and (ii) the coefficient of coupling.

(OR)

8. (a) Explain the analogy between electrical and magnetic circuits. 7M

(b) Determine the inductance of the three series connected inductors as shown in given Fig. 7M



UNIT-V

9. (a) Define the following terms, 7M
(i) Link (ii) Graph (iii) Tree (iv) Node (v) Branch

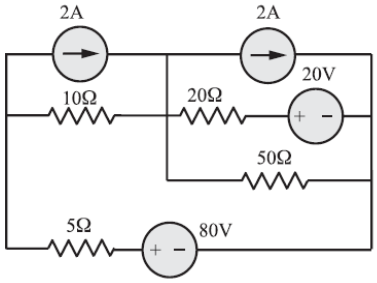
(b) Draw the oriented graph to the incidence matrix shown below. 7M

Nodes ↓ branches

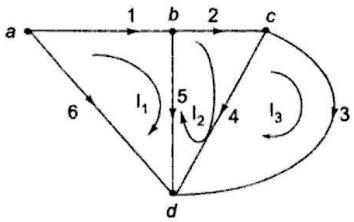
$$\mathbf{A}_n = \begin{array}{c} \\ a \\ b \\ c \\ d \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} -1 & 1 & -1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & -1 & -1 \\ 0 & 0 & 1 & 0 & 1 \end{bmatrix} \end{array}$$

(OR)

10. (a) For the given circuit, form a cut-set schedule. 7M



(b) For the given graph write the fundamental tie set matrix, loop equations and relation between branch and loop currents by choosing a tree consisting of 4,5,6 branches. 7M



Q.P. Code: 916412 **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. II Sem (R15) Supple. Examinations of November 2019

SUB: ENGINEERING DRAWING - II (Common to 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) A Square prism of side of base 40 and axis 80 long, is resting on its base on HP such that a rectangular face of it is parallel to VP. Draw the development of prism. 4M

   (b) A hexagonal prism of side of base 30 and axis 75mm long is resting on its base on HP. Such that a rectangular face is parallel to VP. It is cut by a section plane perpendicular to VP and inclined at 30° to HP. The section plane is passing through the top end of an extreme lateral edge of the prism. Draw the development of the lateral surface of the cut plane. 10M

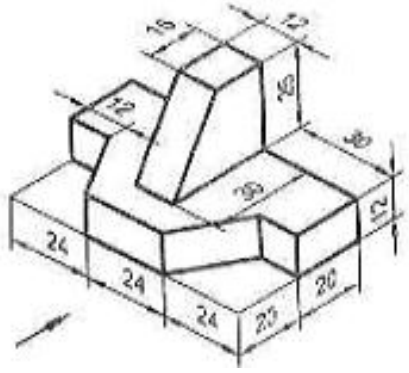
(OR)

2. (a) Draw the development of the lateral surface of the lower portion of the cylinder of diameter 50mm and axis 70mm. The solid is cut by a section plane inclined at 40 degree to HP and perpendicular to VP and passing through the midpoint of the axis. 7M

   (b) A square pyramid, with side of base 30 and axis long is resting on its base on HP with an edge of the base parallel to VP. It is cut by a section plane perpendicular to VP and inclined at 45° to HP. The section plane is passing through the mid-point of the axis. Draw the development of the surface of the cut pyramid. 7M

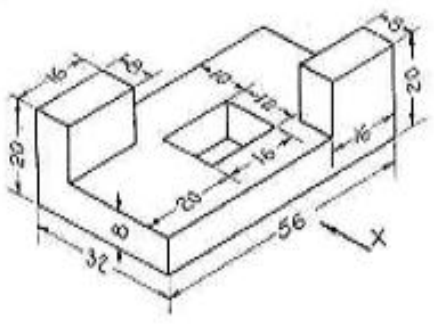
UNIT – II

3. Draw its FV, TV and its RSV. 14M



(OR)

4. Draw its FV, TV and its LSV 14M



UNIT – III

5. (a) Draw an isometric projection of 7M
   i) a square plane of side 40mm
   ii) a rectangular plane 60mm x 80mm
   Both in the horizontal and the vertical plane

   (b) Draw the isometric view of a square prism with the side of the base 40mm and length of the axis 70mm long. When its axis is (i) vertical (ii) horizontal. 7M

(OR)

6. (a) Draw the isometric view of a hexagonal prism, with side of base 20mm and axis 60 long. The prism is resting on its base on HP, with an edge of the base parallel to VP. Use box method 7M

   (b) Draw the isometric view of a pentagonal pyramid, with side of base 20 mm and axis 60mm long. The pyramid is resting on its base on HP, with an edge of the base parallel to VP. Use off set method. 7M

UNIT – IV

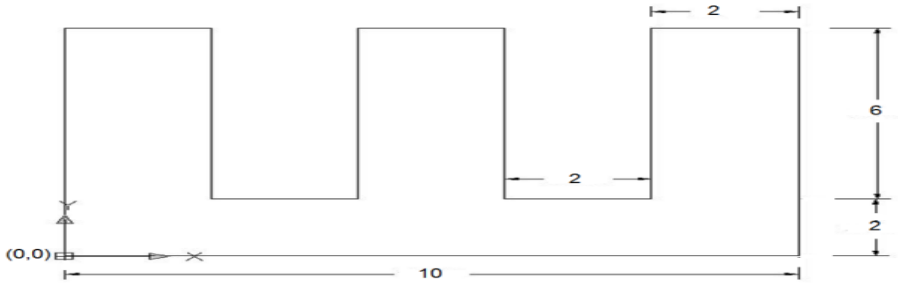
7. A vertical square prism of base 50 side is penetrated by a horizontal square prism of base 40 side such that, the axes intersect. The axis of the horizontal prism is parallel to VP and faces of both the prisms are equally inclined to VP. Draw the projections of the two prisms, showing the lines of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

(OR)

8. A vertical cylinder of 60mm diameter is penetrated by another cylinder of 45 mm diameter. The axes of the two cylinders are intersecting at right angle. Draw the projections of the two cylinders, showing the lines of intersection. 14M

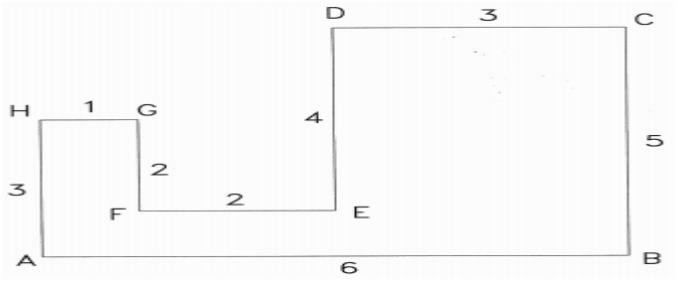
UNIT-V

9. State a series of command steps required to reproduce with the following figure with the help of line command using a combination of Absolute Coordinate System and Relative Coordinate System. 14M



(OR)

10. State a series of command steps required to reproduce with the following figure with the help of line command below using Relative Polar Coordinates System. 14M



Q.P. Code: 916612 | **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. II Sem (R15) Supple. Examinations of November 2019
SUB: ENGLISH - II (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. Write an essay on ‘ the impact of movies on the society’ in 300 words 14M

(OR)

2. Write an essay on ‘Environmental Pollution’ in 300 words. 14M

UNIT – II

3. (a) What is Intonation? Explain the falling and raising tone with an example. 5M

(b) Identify the number of syllables in the following words. 2M

Bicycle

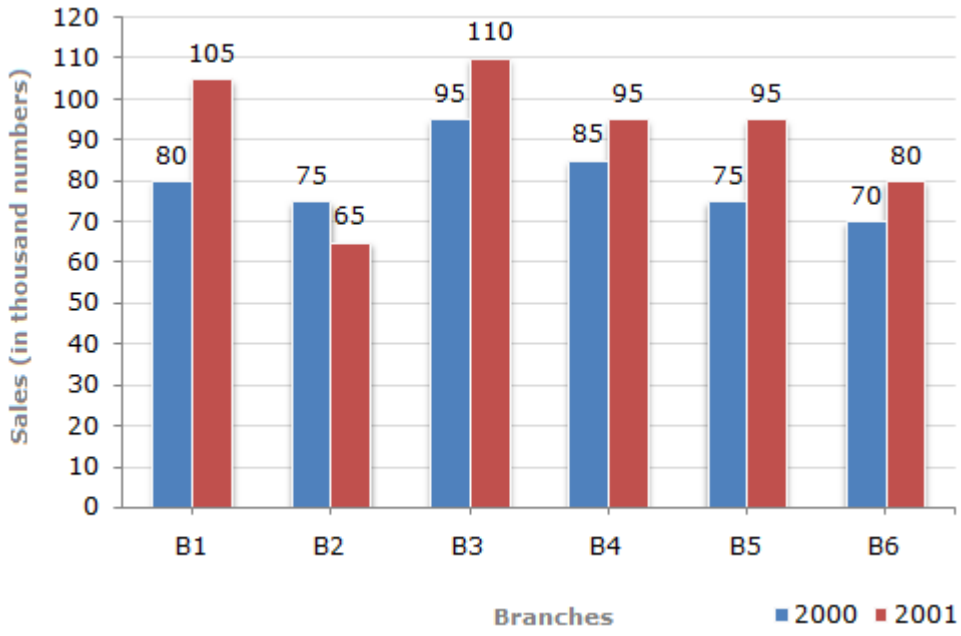
Ceiling

Fancy

Administration

(c) Analyze the given bar chart and write a paragraph on your inferences from the chart. 7M

Sales of Books (in thousand numbers) from Six Branches - B1, B2, B3, B4, B5 and B6 of a publishing Company in 2000 and 2001.



(OR)

4. (a) Write a letter to the editor of a newspaper on the ill effects of war. 7M

(b) Correct the following sentences 7M

i) The leader as well as his brothers belong to the same region.

ii) A large sum of money were stolen

iii) Ram has been living here since ten years.

iv) The team decided to scale the very summit of the mountain.

v) That is a most expensive hotel room I've been in my entire life.

vi) I have made a blunder mistake.

vii) The missile attack was an unexpected surprise.

UNIT – III

5. Write a technical report on establishing English language lab in your college. 14M

(OR)

6. (a) What is Curriculum Vitae? How is it different from a resume? 4M

(b) Write the curriculum vitae of a B.Tech graduate applying for the job of a 'Software Engineer' in HCL. 10M

UNIT – IV

7. (a) Draft a debate on 'Demonetization' 7M

(b) What are the things that a student needs to do before, during and after the interview? 7M

(OR)

8. (a) Construct a dialogue between a student and a teacher on the importance of punctuality and discipline. 7M

(b) Draft a paragraph to be sent through e-mail to your teacher asking him for help to draft a report on English language lab. 7M

UNIT-V

9. (a) What is Group Discussion? How is it different from a debate? What are the qualities required to succeed in a Group Discussion? 7M

(b) List out the dos and don'ts of a group discussion. 7M

(OR)

10. (a) Explain the importance of topic selection and analyzing the audience while drafting a speech. 7M

(b) Draft a speech that needs to be delivered by you as a speaker on a session on 'the freedom of expression'. 7M

Q.P. Code: 916812 | **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. II Sem (R15) Supple. Examinations of November 2019

SUB: MATHEMATICS - III (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 its normal form and hence find its rank

$$A=\begin{pmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{pmatrix}$$

(OR)

2. State Cayley Hamilton theorem. Verify Cayley Hamilton Theorem for the matrix $A=\begin{pmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{pmatrix}$ and hence find A^6 **.**

UNIT – II

3. (a) Find the real root of the equation $x^3 - 2x - 5 = 0$.

   (b) Find by Iterative method, the real root of $3x-\log_{10}x = 6$ correct to 4 significant figures.

(OR)

4. Obtain Newton-Raphson formula to find the square root of N and hence deduce the value of $\sqrt{8}$.

UNIT – III

5. Find the cubic polynomial which takes the following values.
   y(0) = 1, y(1) = 0, y(2) = 1, y(3)=10

(OR)

6. Find the values of *a* and *b* so that $y = a + bx$ fits the data given in the table.

x	0	1	2	3	4
y	1	2.9	4.8	6.7	8.6

UNIT – IV

7. From the following table obtain **dy/dx** and $\mathbf{d^2y/dx^2}$ at x = 3, x = 6

x	0	1	2	3	4	5	6
y	6.9897	7.4036	7.7815	8.1291	8.4510	8.7506	9.0

(OR)

8. Find $\int_0^1 \frac{x^2}{1+x^3}dx$ using Simpson's 1/3 rule by taking 4 subintervals. Also find the error.

UNIT-V

9. Solve by Euler's modified method the equation dy/dx = x + y, y (0) = 0. Choose h = 0.2 compute y (0.4).

(OR)

10. Given dy/dx = x +y, y(0) = 1 find y at x = 0.1, 0.2 and 0.3 by Taylor's series method and compute y(0.4) by Milne's method.

Q.P. Code: 917012 **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. II Sem (R15) Supple. Examinations of November 2019

SUB: ENVIRONMENTAL STUDIES (Common to 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 can we do to help to solve the world's food problems?	7M
	(b)	What is Environment? Discuss scope and importance of Environmental studies.	7M
		(OR)	
2.	(a)	Compare the environmental impact of use of coal and the use of oil?	7M
	(b)	Give details about the equitable use and conservation of natural resources.	7M

UNIT – II

3.	(a)	Describe energy flow pattern in an ecosystem.	7M
	(b)	What do you understand about Ecological Pyramids in an Ecosystem?	7M
		(OR)	
4.	(a)	Define ecological succession. Describe the process of ecological succession.	7M
	(b)	Elaborate the Desert ecosystem in detail?	7M

UNIT – III

5.	(a)	What are the main differences between consumptive use and productive use?	7M
	(b)	What activities and characters of human endanger wildlife?	7M
		(OR)	
6.	(a)	Discuss about the Hot-spots of Biodiversity.	7M
	(b)	Why biodiversity is considered as nation's wealth?	7M

UNIT – IV

7.	(a)	How is water pollution related to agriculture activities? Why this is a growing concern?	7M
	(b)	What is Air pollution? Explain the classification of air pollutants.	7M
		(OR)	
8.	(a)	Furnish the key elements of Landslide Disaster Management.	7M
	(b)	Describe the strategies that would help to encourage the growth of recycling.	7M

UNIT-V

9.	(a)	What role does the status of woman plays in determining population growth rates?	7M
	(b)	Give explanation about the population growth variation among nations.	7M
		(OR)	
10.	(a)	How can cities are made more livable and sustainable.	7M
	(b)	Discuss the objectives of Family Planning Programs.	7M

Q.P. Code: 917212 | **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. II Sem (R15) Supple. Examinations of November 2019
SUB: PROGRAMMING IN C (Common to 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 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 Largest number among 3 numbers?	7M
		(OR)	
4.	(a)	Define Identifier? Explain identifier rules?	7M
	(b)	Write a C Program to print Fibonacci Series?	7M

UNIT – III

5.	(a)	Differentiate among while and do..while loops?	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 two 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)	Explain Linear Search with example?	7M
	(b)	Define String? Explain various String Handling Functions in C with examples?	7M

UNIT-V

9.	(a)	Explain in detail about Typedef and Enumerated Datatypes with examples?	7M
	(b)	Explain Logical, Bitwise and Shift Operators?	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

Q.P. Code: 917612 | **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. II Sem (R15) Supple. Examinations of November 2019
SUB: MATHEMATICS – II (Common to 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 the directional derivative of $f(x,y,z) = xy^2 + yz^3$ at the point (2, -1, 1) in the direction of the vector $i + 2j + 2k$ — 8M

   (b) If $\bar{f} = (x+3y)i + (y-2z)j + (x+pz)k$ is solenoidal, find p — 6M

(OR)

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

UNIT – II

3. (a) Find the Laplace Transform of $te^{-t}\sin 3t$ — 7M

   (b) Evaluate $\int_0^\infty te^{-3t}\sin t\, dt$ — 7M

(OR)

4. Define periodic function, If $f(t)$ is a Periodic function with Period T, then Prove that — 14M

$$L\{f(t)\} = \frac{\int_0^T e^{-st} f(t)\, dt}{1 - e^{-sT}}$$

UNIT – III

5. (a) Find $L^{-1}\left\{\frac{s^2}{(s^2+a^2)^2}\right\}$ — 7M

   (b) Using Convolution theorem, find the Inverse Laplace Transform of $\frac{1}{s(s+1)(s+2)}$ — 7M

(OR)

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

UNIT – IV

7. (a) Find the Fourier series expansion of $f(x) = x$ *in* $0 \le x \le 2\pi$ — 7M

   (b) Obtain the Fourier cosine series of $x\sin x$ in $0 \le x \le \pi$ — 7M

(OR)

8. Find the Fourier series of $f(x) = x + x^2, -\pi < x < \pi$ and hence deduce the series — 14M

$$(i)\ \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\ldots\ldots = \frac{\pi^2}{6} \quad (ii)\ \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \ldots\ldots\ldots = \frac{\pi^2}{12}$$

UNIT-V

9. (a) Form the partial differential equation by eliminating the arbitrary functions from $z = f(y+2x) + g(y-3x)$ 7M

(b) Using the Method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x,0) = 6e^{3x}$ 7M

(OR)

10. A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$ .If it is released from rest from this position, find the displacement $y(x,t)$ 14M

Q.P. Code: 917812 **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA

B. Tech. II Sem (R15) Supple. Examinations of November 2019

SUB: Human Values and Professional Ethics (Common to EEE, ECE & CSE)

Time : 3 Hours Max. Marks: 70

Note: Answer any FIVE Questions. All questions carry Equal Marks.

1.	(a)	How courage is considered as virtue.	14M
	(b)	What are the limitations of codes of ethics?	
	(c)	Differentiate between voluntary and involuntary risk.	
	(d)	What is conscientiousness?	
	(e)	Define safety and risk	
	(f)	What is occupational crime?	
	(g)	Write the importance of honesty.	
2.		Explain various levels and stages of Kohlberg's theory of Moral development.	14M
3.	(a)	Analyze ethical problems in research with an examples.	7M
	(b)	Explain different types of Risks with example.	7M
4.	(a)	Elaborate the role of an engineer in making a product risk-free.	7M
	(b)	Safety is primary in designing a product. Analyze.	7M
5.	(a)	Describe the techniques for achieving collegiality?	7M
	(b)	Explain the relationship between professional responsibility and loyalty to company.	7M
6.		Define environmental ethics. How it is helpful to promote the society? Explain.	14M
7.		Explain the procedure for assessment of safety and risk.	14M
8.		Describe the efforts of an engineer in developing a new design to make a new product.	14M

Q.P. Code: 918412 | **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. II Sem (R15) Supple. Examinations of November 2019
SUB: ENGINEERING CHEMISTRY (Common to 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 meant by Hardness of Waters? What are different units to express hardness of water?	6M
	(b)	Write short notes on : i) Priming and foaming ii) Caustic embrittlement iii) scale and sludge	8M
		(OR)	
2.	(a)	Define softening of water? How zeolite is used in the softening of water?	7M
	(b)	Describe the Electrodialysis method	7M

UNIT – II

3.	(a)	What is meant by Thermosetting & Thermoplastic resins and distinguish between them?	7M
	(b)	Write short notes on Addition & Condensation polymerization	7M
		(OR)	
4.	(a)	What is meant by Vulcanization? How the property of rubber is influence the vulcanization?	6M
	(b)	Write short notes on i) Teflon ii) Bakelite	8M

UNIT – III

5.	(a)	How the corrosion is controlled by cathodic protection? Illustrate by taking suitable example	7M
	(b)	What are fuel cells? Explain the advantage of fuel cells?	7M
		(OR)	
6.	(a)	Explain the mechanism of wet or electrochemical corrosion?	8M
	(b)	What are batteries? How are they classified? Give examples to each	6M

UNIT – IV

7.	(a)	What are the characteristics of good fuel?	7M
	(b)	What is meant by refining of petroleum and explain	7M
		(OR)	
8.	(a)	Define calorific value of a fuel? Distinguish Gross and Net calorific value	7M
	(b)	How do you synthesize petrol by Fischer-Tropsch processes?	7M

UNIT-V

9.	(a)	What is the majour advantage of green chemistry approach in the manufacturing industry?	7M
	(b)	Define the following: i). Catalyst Promoter ii). Catalyst inhibitor iii). Catalytic poison	7M
		(OR)	
10.	(a)	What is meant by the term catalyst? Give general characteristics of catalytic reactions	7M
	(b)	Write short notes on: i) Catalyst and energy of activation ii) Specificity of catalytic action.	7M

Q.P. Code: 918612 | **SET - 2**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. II Sem (R15) Supple. Examinations of November 2019
SUB: ENGINEERING PHYSICS (Common to 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) Explain the single slit diffraction. A slit of width 1.5mm is illuminated by a light of wavelength 500nm and diffraction pattern is observed on a screen 2m away from the slit. Calculate the width of central maximum. 7M
   (b) Describe Nd- YAG laser. Write any four applications of it. 7M

(OR)

2. (a) Describe He-Ne laser. Write any four applications of it. 7M
   (b) Explain fiber optic communication system. Write any four advantages of optical fibers. 7M

UNIT – II

3. (a) What is packing fraction? Derive the packing fraction of bcc system. Copper has fcc structure. The atomic radius is 1.278 A^0 . Calculate the interplanar spacing for (111) planes. 7M
   (b) Describe the powder method to determine the crystal structure. 7M

(OR)

4. (a) Explain the different techniques to determine the ultrasonic waves. Write any two properties of ultrasonic waves. 7M
   (b) Explain non destructive testing method. Write any two advantages of it. 7M

UNIT – III

5. (a) Derive the Schrodinger's time independent wave equation. Give the significance of the wave function. 7M
   (b) Explain the band theory of solids. Give the significance. Write the failures and successes of quantum free electron theory. 7M

(OR)

6. (a) Write the similarities and differences between classical and quantum free electron theories. 7M
   (b) State the assumptions of quantum free electron theory. Write the failures of classical free electron theory. 7M

UNIT – IV

7. (a) Define Bohr magneton. Write its value. Explain the origin of magnetic moments. Derive the equation for orbital magnetic moment of an electron. 7M
   No. of atoms in metal is $9.14 \times 10^{28}/m^3$. Magnetic induction B = 0.65 wb/m^2 . Calculate the magnetic moment of the metal in Bohr magneton.
   (b) Define (i) coercivity (ii) retentivity. Write any four applications of hard and soft magnetic materials. Give one example for each. 7M

(OR)

8. (a) Define (i) superconductivity (ii) Critical Temperature (iii) Critical magnetic field and (iv) critical current. Write the equation connecting H_c and T_c. The T_c of a superconductor is 8.7K. The magnetic field at 0K is 3 x 10^6 A/m. Find the temperature at which critical magnetic field is 6 x 10^5 A/m. 7M

(b) Explain Meissner effect. Write any six applications of superconductors. 7M

UNIT-V

9. (a) Differentiate direct and indirect band gap semiconductors. Give two examples for each. 7M

(b) Define i) intrinsic ii) extrinsic semiconductors and iii) band gap energy. Write the common dopants to form n type and p type semiconductors. Explain the mechanism of conduction in an intrinsic semiconductors. 7M

(OR)

10. (a) Explain (i) optical (ii) magnetic (iii) inter- particle spacing and (iv) reactivity and catalytic properties. 7M

(b) Explain Ball mill method. Write any three advantages and disadvantages for each. 7M