K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Linear IC Applications (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) Draw the block diagram of a typical op-amp and explain it.   7M
   (b) Derive the expression for operating point from the DC analysis of Differential amplifier.   7M

(OR)

2. (a) List out the three open loop op-amp configurations and draw their circuit diagrams. Explain why open loop op-amp configurations are not used in linear applications.   7M
   (b) Draw the circuit diagram of level translator using emitter follower and explain its operation.   7M

UNIT – II

3. (a) Draw the circuit diagram of Non – inverting summing amplifier. Derive the expression for output voltage.   7M
   (b) Draw the circuit diagram of precision full wave rectifier and explain its operation.   7M

(OR)

4. (a) Explain the operation of ideal integrator with the help of circuit and frequency response characteristics.   7M
   (b) What are the problems associated with the above circuit? Explain how they are overcome in a practical integrator.   7M

UNIT – III

5. (a) Explain the operation of square wave generator using op-amp and derive the expression for Frequency of oscillations.   7M
   (b) Design a second order Butterworth LPF filter having a upper cutoff frequency of 1KHz.   7M

(OR)

6. (a) Explain the operation of Inverting and non-inverting comparator by drawing the input and output waveforms.   8M
   (b) Design a first order HPF at a cutoff frequency of 1KHz with a pass band gain of 2.   6M

UNIT – IV

7. (a) Draw the functional diagram of Monostable Multivibrator using 555 timer and explain its operation.   8M
   (b) Explain the operation of analog phase detector.   6M

(OR)

8. (a) Explain the principle of Wein bridge oscillator and obtain the expression for frequency of oscillations.   7M
   (b) Design a Astable Multi vibrator using 555 timer having an output frequency of 100 Hz with a duty cycle of 75%   7M

UNIT-V

9. (a) Draw the circuit diagram of 4-bit R-2R ladder DAC and derive the expression for output voltage.   8M
   (b) Draw the basic circuit of 3-bit parallel Comparator ADC and explain its operation.   6M

(OR)

10. (a) A dual slope ADC uses a 18-bit counter with a 5MHz clock. The maximum input voltage is +12 V and the maximum integrator output voltage at 2^n count is -10 V. If R = 100 K ohms, find the size of the capacitor to be used for integrator.   7M
    (b) Calculate the values of the LSB, MSB & maximum output voltage for an 8-bit 0 V to 10 V range DAC   7M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Electromagnetic Theory and Transmission Lines (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) Two infinite uniform sheets of charge, each with density ρ_s are located at $x = \pm 1$ .Determine E in all regions   6M
   (b) Derive an expression for the Continuity equation and Relaxation time   8M

(OR)

2. (a) Using Gauss's law, derive an expression for electric field intensity due to infinite line charge   7M
   (b) Two Point charges -4μC and 5μC are located at (2,-1,3) and (0,4,-2) respectively. Find the potential at (1,0,1), assuming zero potential at infinity   7M

UNIT – II

3. (a) Explain the concept of scalar and vector Magnetic potential   6M
   (b) A 4 mC charge has velocity $v = 1.4a_x - 3.2a_y - a_z m/s$ at point $P(2,5,-3)$ in presence of $E = 2xyza_x + x^2za_y + x^2ya_z V/m$ and $B = y^2a_x + z^2a_y + x^2a_z Wb/m^2$. Find the force on the charge at P 8M

(OR)

4. (a) A circular loop located on $x^2 + y^2 = 9, z = 0$ carries a direct current of 10A along a_ϕ. Determine H at (0,0,4) and (0,0,-4)   8M
   (b) State Ampere's circuital law. Apply this law to find magnetic field H due to infinitely long conductor carrying current "I" amp   6M

UNIT – III

5. (a) What is the inconsistency in Ampere's law? Explain how Maxwell modified this Law   7M
   (b) Region 1 is $y > 0$ with $\mu_1 = \mu_0$,while region 2 is $y < 0$ with $\mu_2 = 12\mu_0$ .If $B_2 = 1.4a_x + 0.6a_y - 2a_z Wb/m^2$ .find $H_1 \& B_1$ 7M

(OR)

6. (a) Derive the boundary conditions for the tangential and normal components of Electrostatic fields at the boundary between two perfect dielectrics   8M
   (b) In a dielectric $(\sigma = 10^{-4} S/m, \mu_r = 1, \varepsilon_r = 4.5)$,the conduction current density is given as $J_c = 0.4\cos(2\pi 10^8 t) A/m^2$ .Determine the displacement current density.   6M

UNIT – IV

7. (a) Derive the expression for attenuation constant and phase constant from complex propagation constant in general medium   7M
   (b) A Uniform plane wave $E_i = 50\sin(2\pi 10^8 t - \beta_1 x)a_z V/m$ is incident normally from air to a perfect conductor. Determine E_t and E_r 7M

(OR)

8. (a) State and prove pointing theorem   8M
   (b) An EM wave propagating in a certain medium is described by $E = 25\sin(2\pi X10^6 t - 6x)a_z V/m$ Determine the direction of wave propagation, wavelength and the velocity   6M

UNIT-V

9. (a) A load of $Z_L = 100 + j150 \, \Omega$ is connected to a $75 \, \Omega$ lossless line. Using a smith chart, determine the reflection coefficient and the standing wave ratio   7M

    (b) A lossy transmission line of length 2.1 m has characteristic impedance of $80 + j60 \, \Omega$.When the line is short circuited, the input impedance is $30 - j12\Omega$.Determine attenuation constant (α) and phase constant (β) 7M

(OR)

10. (a) Starting from the equivalent circuit, derive the transmission line equations for V and I.   7M

    (b) A transmission line operating at 500 MHz has $Z_0 = 80\,\Omega$, $\alpha = 0.04 Np/m$ and $\beta = 1.5 rad/m$.Calculate R , L , C , and G of the line   7M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Computer Organization (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)	Draw and explain various functional units of a computer	7M
	(b)	Explain basic operational concepts	7M

(OR)

2.	Illustrate Floating Point representation with an example	14M

UNIT – II

3.	(a)	What is a register? Explain about Register transfer	7M
	(b)	Write about bus system for four registers.	7M

(OR)

4.	(a)	Discuss about shift micro operations.	7M
	(b)	Design 4 bit Arithmetic circuit and explain	7M

UNIT – III

5.	What is addressing mode? Briefly explain various addressing modes.	14M

(OR)

6.	(a)	Demonstrate Micro program example	7M
	(b)	Develop and explain Hardware Algorithm for multiplication	7M

UNIT – IV

7.	(a)	What is Parallel Processing? Explain in detail about pipelining	9M
	(b)	Sketch Memory Hierarchy and explain	5M

(OR)

8.	(a)	Explain in detail about Instruction Pipeline	7M
	(b)	Define virtual memory? Explain about virtual memory	7M

UNIT-V

9.	(a)	Enumerate Modes of Transfer in detail	7M
	(b)	Demonstrate how priority Interrupt is handled.	7M

(OR)

10.	Summarize the following	14M
	(a) Inter Processor Communication (b) Synchronization.	

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Operating Systems (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 in detail about the computer operating systems with neat sketch.   7M
   (b) Explain briefly about various OS services.   7M

(OR)

2. (a) Illustrate and explain operating system structure.   7M
   (b) Explain in detail about System programs.   7M

UNIT – II

3. (a) Assume you have the following jobs to execute with one processor, with the jobs   7M
       arriving in the order listed here:

i	T(pi)	Arrival Time
1	8	0
2	4	1
3	9	2
4	5	3

   (i) Suppose a system uses SJF scheduling. Create a Gantt chart illustrating the
       execution of these processes?
   (ii) What is the turnaround time for process 2?
   (iii) What is the average wait time for the processes?

   (b) Explain in detail about process scheduling and scheduling criteria.   7M

(OR)

4. Explain in detail classic problems of synchronization with examples.   14M

UNIT – III

5. (a) Explain in detail about memory management and contiguous memory allocation   7M
       strategies with example.
   (b) Explain concept of segmentation taking suitable example. Explain translation of   7M
       Logical address into physical address by segment table.

(OR)

6. (a) What do you mean by virtual memory? Why is it needed? Discuss the hardware   7M
       support required by the operating system to implement the virtual memory concept.
   (b) Write brief note on demand paging and describe in detail steps in handling a page   7M
       fault.

UNIT – IV

7. List four necessary conditions for deadlock to occur. Explain different algorithm for   14M
   avoidance of deadlock.

(OR)

8. (a) Explain the structure of directory with a neat sketch.   7M
   (b) Explain in detail about File sharing and protection methods.   7M

UNIT-V

9. (a) Write brief note on protection. Explain the various principles of protection.   7M
   (b) Explain briefly about implementation of access matrix.   7M

(OR)

10. (a) Compare and contrast the terms external and operational security in context of   7M
        operating system.
    (b) Define program threat. List various threats and explain in detail.   7M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Design and Analysis of Algorithms (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. Define the asymptotic notations used for best case average case and worst case analysis of algorithm? 14M

(OR)

2. Write an algorithm for finding maximum element of an array; perform best and average case complexity with appropriate order notations? 14M

UNIT – II

3. (a) Give a detailed note on Divide and Conquer techniques? 7M

   (b) Sort the following set of elements using merge sort 12,24,8,71,4,23,6,89,56 7M

(OR)

4. (a) Write a pseudo code for a divide and conquer algorithm for merging two sorted arrays into a single sorted one? 7M

   (b) Explain Knapsack Problem with example? 7M

UNIT – III

5. Describe the travelling salesman problem and discuss how to solve it using dynamic programming? 14M

(OR)

6. How will you construct a optimal search tree with example? 14M

UNIT – IV

7. Give a suitable example and explain the birth first search and depth first search algorithm? 14M

(OR)

8. (a) Using Backtracking enumerate how can you solve the following problems
   (a) 8-Queens problem 7M

   (b) (b) Hamiltonian circuit problem 7M

UNIT-V

9. (a) Compare Backtracking & Branch and Bound techniques with an example 7M

   (b) What are the applications of branch & bound? 7M

(OR)

10. Explain NP-hard and NP complete problems with example. 14M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Java Programming (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) Discuss Java Buzzwords   7M
   (b) Explain the concept of classes and objects   7M
   (OR)
2. (a) Define Constructor? Explain Overloading with an example?   7M
   (b) Define Overriding? Explain in detail with an example?   7M

UNIT – II

3. (a) Define Super? Explain final with Inheritance?   7M
   (b) Define Interface? Explain the use of Interface with an example.   7M
   (OR)
4. (a) Define Polymorphism? Explain different types of Polymorphism with examples?   7M
   (b) Write a Java program that implements interfaces?   7M

UNIT – III

5. (a) Explain throw, throws, try and catch keywords?   8M
   (b) Write a Java program to create multiple threads.   6M
   (OR)
6. (a) Explain concept of Exception hierarchy?   5M
   (b) Write a Java Program that demonstrates Thread Priorities   9M

UNIT – IV

7. (a) Explain AWT Components?   5M
   (b) Discuss various types of Layouts?   9M
   (OR)
8. (a) Write a Java Program that implements Mouse events?   9M
   (b) Explain Adapter classes with example.   5M

UNIT-V

9. (a) Define Applet? Explain the Life cycle of an Applet?   7M
   (b) Explain passing parameters to Applets?   7M
   (OR)
10. (a) Differentiate between Applets and Applications   5M
    (b) Create a scroll pane in Java using swings   9M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Formal Languages and Automata Theory (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)　Construct DFA over input alphabet {a, b} to accept all the strings in which number of a's are divisible by 3　　6M

　　(b)　Construct the Mealy machine equivalent to the Moore machine M defined by table 1.　　8M
　　　　Table 1:

State	a=0	a=1	output
q1	q1	q2	0
q2	q1	q3	0
q3	q1	q3	1

(OR)

2.　(a)　Let Σ = {a, b}, a) Give DFA that accepts any string with aababb as a substring.　　4M

　　(b)　Minimize the DFA obtained for the answer of question 2(a) using Myhill Nerode theorem.　　10M

UNIT – II

3.　(a)　Construct Finite Automata for the regular Expression 1(01+10)*00?　　6M

　　(b)　Show that $L=\{a^{2n}/n<0$ is regular.　　8M

(OR)

4.　(a)　Construct left linear grammar for the language$(0+1)*00(0+1)*$　　8M

　　(b)　Explain Arden's theorem with an example.　　6M

UNIT – III

5.　(a)　Consider the CFG with {S,A,B} as the non-terminal alphabet, {a, b} as the terminal alphabet, S as the start symbol and the following set of production rules　　8M
　　　　$S \rightarrow ASA \mid aB \mid b$
　　　　$A \rightarrow B$
　　　　$B \rightarrow b \mid \in$
　　　　Find a reduced grammar equivalent to the above grammar.

　　(b)　Convert the grammar S->0AA,A ->0S/1S/0 to a PDA that Accepts the same Language by Empty Stack?　　6M

(OR)

6.　(a)　Show that $L=\{a^{p}/p$ is prime} is Context free?　　6M

　　(b)　Construct CNF for the Grammar S->ABC, A->0B,B->CD/0,C->1　　8M

UNIT – IV

7.　(a)　Explain the various ways of determining the acceptability of Pushdown Automata　　8M

　　(b)　Construct a PDA that accepts $L = \{0^{n} 1^{n} \mid n \geq 0\}$　　6M

(OR)

8.　(a)　Construct a PDA M equivalent to the following CFG S->0BB, B->0S/1S/0, test whether 010^{4} is in N(M)?　　5M

　　(b)　Find GNF equivalent to the following Grammar　　9M
　　　　S->AA/a　　　　　　　A->SS/b

UNIT-V

9.　(a)　Define Post Correspondence Problem? Explain in brief about PCP with an example?　　6M

　　(b)　Design a Turing Machine for $L=\{0^{n} 1^{m} 0^{n} 1^{m}/m, n>=1\}$　　8M

(OR)

10.　(a)　Why a Turing machine is called Linear Bounded Automata? Discuss the advantages of Linear Bounded Automata.　　6M

　　(b)　Construct the Turing machine that accepts all a's and b's such that no of a's is equal to no of b's.　　8M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Digital System Design (EEE)

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 following codes   10M
       i) Sequential Codes
       ii) Gray Code
       iii) Weighted and Non weighted codes
       iv) Error detecting and correcting codes   (v) Cyclic codes
   (b) Given that $(292)_{10} = 1204$ in some number system, find the base of that system.   4M

(OR)

2. (a) What is Gray code? Convert the Gray number 10110010 into   7M
       i) Hex   (ii) Octal   (iii) Decimal
   (b) What is Hamming code? Encode the message $(1101)_2$ into the 7-bit even parity Hamming Code.   7M

UNIT – II

3. (a) Draw the logic symbols, construct truth tables and with the help of circuit diagram explain the working of the following gates.   8M
       i) NAND   (ii) NOR
   (b) Reduce the expression f = (A+B) (A+B') (A'+B') using K-map.   6M

(OR)

4. (a) State and prove commutative law, Absorption law and DeMorgan's Theorem.   7M
   (b) Express the Boolean function F = A + B'C as a sum of minterms.   7M

UNIT – III

5. (a) Distinguish between an encoder and a decoder with neat sketches.   7M
   (b) Define Hazard? Explain the types and Hazard free realization.   7M

(OR)

6. (a) Design and implement Half-adder using two input NAND gates.   7M
   (b) Explain the differences between a MUX and a DEMUX. Realize 16-input multiplexer by cascading of two 8-input multiplexers.   7M

UNIT – IV

7. (a) Draw and explain the circuit diagram of positive edge triggered J-K flip-flop using NAND gates with its truth table. How race around conditions are eliminated?   8M
   (b) Discuss about 3-bit synchronous and ripple counters. Compare their merits and demerits.   6M

(OR)

8. (a) Explain 4-bit universal shift register with logic diagram.   7M
   (b) Design a Mod-6 asynchronous counter using T-FFs.   7M

UNIT-V

9. (a) Implement $f(A,B,C,D) = \Sigma(0,1,4,5,6,9,10,12,13,15)$ using PLA and explain its procedure.   7M
   (b) Explain about the RAM types and its internal cell structure in detail.   7M

(OR)

10. (a) Give the comparison between PROM, PLA and PAL.   6M
    (b) Explain about the RAM types and its internal cell structure in detail.   8M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Basics of Electronics Engineering (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 is PN junction diode? With the help of circuit diagram, Explain the VI characteristic of diode. — 8 M
   (b) Explain how Zener diode helps in voltage regulation with neat diagram. — 6 M

(OR)

2. (a) What is rectifier? Explain the classification of rectifier along with applications? — 6 M
   (b) Derive the following expressions for half wave rectifier (i) I_{dc} (ii) I_{rms} (iii) η (iv) γ — 8 M

UNIT – II

3. (a) Explain the operation of transistor in PNP configuration. — 6 M
   (b) With a neat circuit diagram, explain the input and output characteristics of Common emitter configuration. — 8 M

(OR)

4. (a) Explain how transistor acts as amplifier. — 6 M
   (b) Explain the operation and working principle of single stage CE amplifier. — 8 M

UNIT – III

5. (a) Explain construction, working and characteristics of N-channel JFET. — 10M
   (b) For a JFET I_{DSS} = 9mA & $V_{GS(off)}$ = -8V (max), determine drain current at V_{GS}=-4V — 4 M

(OR)

6. (a) Explain the drain and transfer characteristics of JFET with neat diagram. — 7 M
   (b) Compare BJT and JFET. — 7 M

UNIT – IV

7. (a) Explain barkhausen Criterion with neat diagram. — 6 M
   (b) Draw the circuit diagram of Colpitt's oscillator and explain its working. — 8 M

(OR)

8. (a) What is an oscillator? Explain the principle of oscillator. — 6 M
   (b) Draw the circuit diagram of Hartley oscillator and explain its working. — 8 M

UNIT-V

9. (a) Explain the working principle of multimeter. — 6 M
   (b) Explain the working of successive approximation DVM. — 8 M

(OR)

10. (a) Discuss about Electrostatic Deflection. — 4 M
    (b) Explain the measurement of Frequency using CRO with neat diagram. — 10M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Mathematics – III (EEE)

Time: 3 Hours   Max. Marks: 70

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

UNIT – I

1. Show that the coefficient of t^n in the power series expansion of $e^{\frac{x}{2}(t-\frac{1}{t})}$ is $J_n(x)$.   14M

(OR)

2. State and prove Rodrigue's formula   14M

UNIT – II

3. (a) Show that polar form of C-R equations are $\dfrac{\partial u}{\partial r}=\dfrac{1}{r}\dfrac{\partial v}{\partial\theta},\dfrac{\partial v}{\partial r}=\dfrac{1}{r}\dfrac{\partial u}{\partial\theta}$ deduce that   7M

   $\dfrac{\partial^2 u}{\partial r^2}+\dfrac{1}{r}\dfrac{\partial u}{\partial r}+\dfrac{1}{r^2}\dfrac{\partial^2 u}{\partial\theta^2}=0$

   (b) S.T $f(z)=e^z$ is analytic everywhere in the complex plane and find $f^1(z)$ 7M

(OR)

4. (a) Find the orthogonal trajectories of the family of curves $x^3 y - xy^3 = C$ 7M

   (b) Find a and b if $f(z)=x^2-2xy+ay^2)+i(bx^2-y^2+2xy)$ is analytic. Find f(z) in terms of Z.   7M

UNIT – III

5. Find the bilinear transformation which maps the points $z=1,i,-1$ on to the points $w=i,0,-i.$ Hence find the invariant points of this transformation.   14M

(OR)

6. Under the transformation $w=\dfrac{z-1}{z+1}$, show that the map of the straight line $x=y$ is a circle and find its centre and radius.   14M

UNIT – IV

7. (a) Evaluate $\displaystyle\int_{z=0}^{z=1+i}(x^2+2xy+i(y^2-x))dz$ along $y=x^2$.   7M

   (b) Evaluate $\displaystyle\oint_c \dfrac{e^{2z}}{(z+i)^4}dz$ Where C is the circle $|z|=3$ 7M

(OR)

8. Evaluate $\displaystyle\oint_C \dfrac{e^z}{(z^2+\pi^2)^2}dz$ Where C is the circle $|z|=4$ 14M

UNIT-V

9. (a) State and prove Cauchy's residue theorem   7M

   (b) Evaluate $\displaystyle\int_C \dfrac{2z+1}{(2z-1)^2}dz$ Where C is $|z|=1$ 7M

(OR)

10. Show that $\displaystyle\int_0^{2\pi}\dfrac{\cos 2\theta}{1-2a\cos\theta+a^2}d\theta=\dfrac{2\pi a^2}{1-a^2},a^2<1$ 14M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Probability and Statistics (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 random variable X has the following probability distribution.   14M

$X = x$	-3	-2	-1	0	1	2	3
$P(X = x)$	K	0.1	K	0.2	$2K$	0.4	$2K$

Find (i) the value of K (ii) Mean (iii) Variance and (iv) Standard deviation.

(OR)

2. (a) Let X be a random variable with density function   7M

$$f(x) = \begin{cases} \dfrac{x^2}{3}, & -1 < x < 2 \\ 0, & \text{elsewhere} \end{cases}$$

Find the expected value of $4X + 3$.

(b) The frequency function of a continuous random variable X is given by   7M
$f(x) = y_0 x(2 - x), 0 \le x \le 2$. Find the value of y_0, mean and variance of X.

UNIT – II

3. (a) Out of 800 families with 5 children each, how many would you expect to have   7M
(i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys. Assume equal probabilities for boys and girls.

(b) Fit a Poisson distribution for the following and calculate the expected frequencies: 7M

x	0	1	2	3	4	Total
f	122	60	15	2	1	200

(OR)

4. (a) Buses arrive at a specified stop at 15 min. intervals starting at 7 A.M., that is, they arrive at 7,   7M
7:15, 7:45 and so on. If a passenger arrives at the stop at a random time that is uniformly distributed between 7 and 7:30 A.M., find the probability that he waits (a) less than 5 min. for a bus and (b) at least 12 min. for a bus.

(b) The mean and standard deviation of the marks obtained by 1000 students in an examination   7M
are respectively 34.5 and 16.5. Assuming the normality of the distribution, find the approximate number of students expected to obtain marks between 30 and 60.

UNIT – III

5. (a) In a sample of 1000 people in Karnataka, 540 are rice eaters and the rest are wheat eaters.   7M
Can we assume that both rice and wheat are equally popular in this state at 1% LOS?

(b) The means of two samples of 1000 and 2000 items are 67.5 and 68.0 respectively. Can the   7M
samples be regarded at 5% LOS, has drawn from the same population with standard deviation 2.5?

(OR)

6. (a) The average marks scored by 32 boys are 72 with a standard deviation of 8, while that for 36 girls is 70 with a standard deviation of 6. Test at 1% LOS whether the boys perform better than girls.   **7M**

 (b) A sample of 100 electric light bulbs produced by manufacturer A showed a mean lifetime of 1190 hours and a standard deviation of 90 hours. A sample of 75 bulbs produced by manufacturer B showed a mean life time of 1230 hours, with a standard deviation of 120 hours. Is there a difference between the mean life time of the two brands at a significance level of 0.05?   **7M**

UNIT – IV

7. The nicotine contents in two random samples of tobacco are given below: **14M**

Sample 1	21	24	25	26	27	--
Sample 2	22	27	28	30	31	36

Can you say that the two samples came from the same population?

(OR)

8. The following data is collected on two characters. Based on this, can you say that there is no relation between smoking and literacy?   **14M**

	Smokers	Non-smokers
Literates	83	57
Illiterates	45	68

UNIT-V

9. Given below are the values of sample mean $\bar{X}$ and sample range R for 10 samples, each of size 5. Draw the appropriate mean and range charts and comment on the state of control of the process.   **14M**

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	43	49	37	44	45	37	51	46	43	47
Range	5	6	5	7	7	4	8	6	4	6

(OR)

10. A quality control effort is being attempted for a process where large steel plates are being manufactured and surface defects are of concerned. The goal is to setup a quality control chart for the number of defects per plate. The data are as follows: **14M**

Sample No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
No. of defects	4	2	1	3	0	4	5	3	2	2	1	2	2	3	1	4	3	2	1	3

Setup the appropriate control chart, using this sample information. Does the process appear to be in control?

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Biology for Engineers (CE- Re Admitted)

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 importance of biological classification of organisms? And write about three domain system   7M
   (b) Explain about Five Kingdom classification   7M

(OR)

2. (a) Write about the contributions of Louis Pasteur   7M
   (b) Write about contributions of Joseph Lister   7M

UNIT – II

3. (a) Explain history and evolution in brief   7M
   (b) Explain Mitochondria and Ribosomes   7M

(OR)

4. (a) What are prokaryotes? Write their history and evolution in brief   7M
   (b) Explain about Chlroplast and Ribosomes   7M

UNIT – III

5. (a) Explain about Fibrous proteins and Protamines   7M
   (b) Explain about Monosaccharides, polysaccharides with atleast two examples   7M

(OR)

6. (a) Explain about Unsaturated fatty acids with examples   7M
   (b) Explain about Nutritional and physiological importance of lipids   7M

UNIT – IV

7. (a) Explain about Eukaryotic gene   7M
   (b) Explain about Structure of prokaryotic gene in brief   7M

(OR)

8. (a) Explain about DNA replication in prokaryotes in brief   7M
   (b) Explain about Replication of DNA in eukaryotes in brief   7M

UNIT-V

9. (a) Explain about Ligases   7M
   (b) Explain about Oxidoreductases   7M

(OR)

10. (a) Explain about Glycolysis   7M
    (b) Explain about Importance of Krebs cycle   7M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Biology for Engineers (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)	Illustrate the structure of the cell	7M
	(b)	Discuss in detail the Animal tissue	7M

(OR)

2.	(a)	Define cell and explain cell theory	7M
	(b)	Explain protoplasm in detail	7M

UNIT – II

3.	(a)	State the structure of the carbohydrates	7M
	(b)	Discuss in detail Nucleic acids	7M

(OR)

4.	(a)	Illustrate the major applications of enzymes in Industry	7M
	(b)	Discuss in detail the large scale production of enzymes by fermentation	7M

UNIT – III

5.	(a)	Illustrate various steps involved in human digestive system	7M
	(b)	Explain Aerobic & anaerobic respiration in detail	7M

(OR)

6.	(a)	Discuss various respiratory organs	7M
	(b)	Examine the steps involved in the physiology of human excretory system	7M

UNIT – IV

7.	(a)	Describe in detail the structure of Prokaryotic gene	7M
	(b)	Explain the process of replication of DNA in detail	7M

(OR)

8.	(a)	Explain Transcription and translation in Eukaryotes	7M
	(b)	Explain briefly recombinant DNA technology	7M

UNIT-V

9.	(a)	Explain in detail cloning in plants and animals	7M
	(b)	Illustrate the applications of transgenic plants and animals	7M

(OR)

10.	(a)	Explain In detail Biochips and Biofuels	7M
	(b)	Write a detailed note on tissue engineering	7M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Effective Technical Communication (CE)

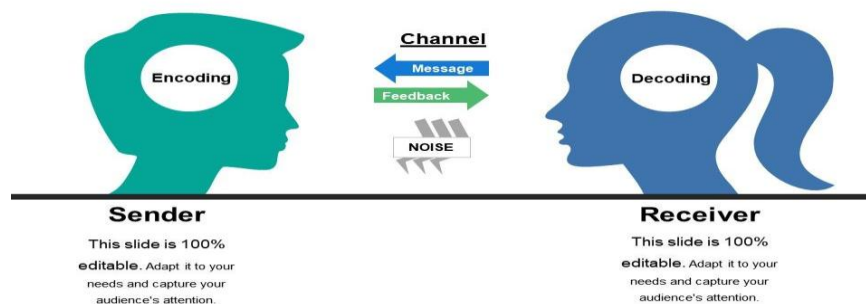Time: 3 Hours   Max. Marks: 70
Answer any FIVE Questions choosing one question from each unit.
All questions carry Equal Marks.

UNIT - I

1. (a) What are psychological barriers of Communication? Suggest remedies.   7M
    (b) Explain the process of Communication using the following Model: 7M

Communication Model Showing Sender Receiver...

(OR)

2. (a) Define Communication and elucidate the significance of communication.   7M
    (b) What are the types of Professional Communication?   7M

UNIT – II

3. (a) How does writing a draft lead to perfect writing?   7M
    (b) What are the grammatical features of a good technical writing?   7M
(OR)
4. (a) Collaborative Writing is the need of the hour in the current team based workplaces. –   7M
         Discuss.
    (b) Detail the Editing strategies.   7M

UNIT – III

5. (a) Time is money – Explain the Time management techniques.   7M
    (b) Goal setting provides navigation to success. – Discuss.   7M
(OR)
6. (a) How do self-awareness and self-assessment help to improve self-development? 7M
    (b) Engineering is a creative science – Relate creative skills to engineering.   7M

UNIT – IV

7. (a) Write a Report to Head of Health Wing of your company about the status of Corona Virus and suggest remedies by using the following graph.　　7M

Confirmed Coronavirus Cases
Total confirmed cases of the COVID-19 coronavirus in 2020

214,900*

300

* As of March 18, 2020
Figures rounded to the nearest hundred
Source: Johns Hopkins University

statista
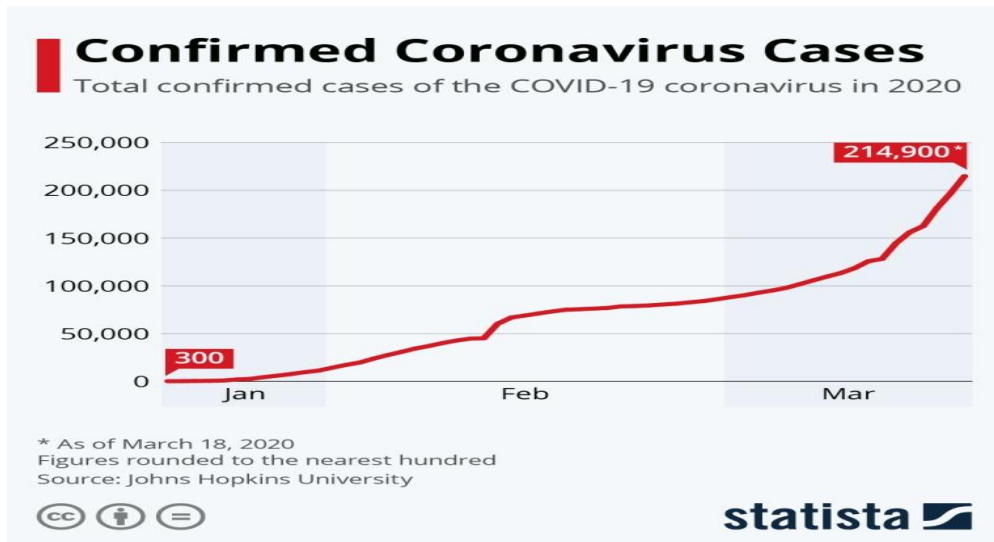
   (b) Describe the Public speaking techniques.　　7M

(OR)

8. (a) Write a Report to Education Ministry on Suicides by Youngsters in Asia using the following data. Suggest recommendations to prevent suicides.　　7M

Teenage suicide rates in Asia (deaths per 100,000 in 2016)

Source: World Health Organization
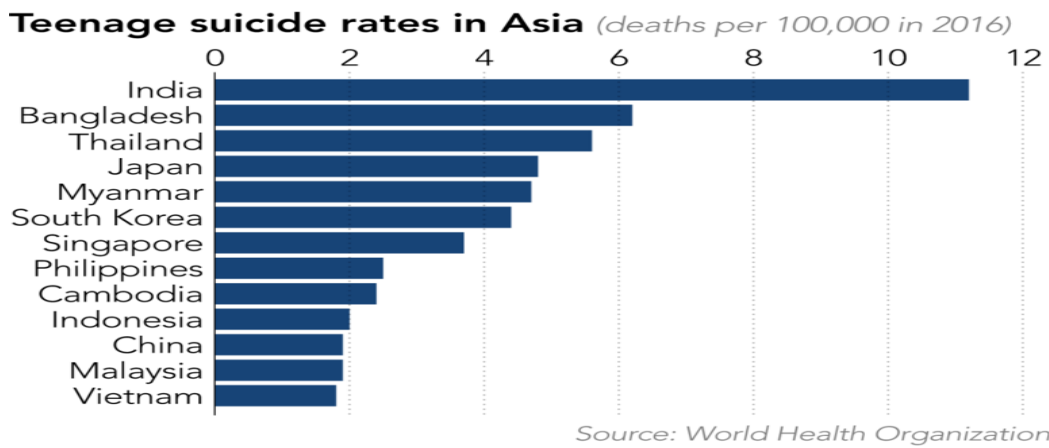
   (b) Write a letter to DELL Company's sales executive making a purchase order of 30 Computers for your office. Your letter should comprise the configuration and other details.　　7M

UNIT-V

9. (a) What are professional etiquettes? How one should follow them?　　7M
    (b) A good mobile etiquette can fetch you a job. – Discuss.　　7M

(OR)

10. (a) What is the structure of an email and mention e mail etiquettes.　　7M
    (b) Work culture is based on the leaders and administrators. – Elucidate.　　7M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Managerial Economics & Financial Analysis (CE)

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

UNIT - I

1. "Managerial Economics is an integration of economic theory, decision science and business management"-Discuss   14M

(OR)

2. (a) Explain the important determinants of demand   7M
    (b) Critically examine the various methods of forecasting   7M

UNIT – II

3. (a) Discuss the cost output relationship in the long run.   7M
    (b) Distinguish between explicit cost and implicit cost   7M

(OR)

4. (a) Explain and illustrate break even chart .point out the usefulness of break -even analysis   14M

UNIT – III

5. Discuss the different types of market structures   14M

(OR)

6. Briefly explain important pricing methods   14M

UNIT – IV

7. (a) What are features of joint stock company   7M
    (b) Explain types of partners   7M

(OR)

8. (a) Define capital Budgeting .Explain its techniques in detail.   14M

UNIT-V

9. (a) Write the journal entries the following transactions.   10M

Date	particulars	Amount in Rs
1-1-2019	Started business with cash	10000
2-1-2019	Amount deposited into bank	5000
3-1-2019	Goods purchased from Ramu	3000
4-1-2019	Goods sold to Raju	4000
5-1-2019	Furniture purchased	5000
7-1-2019	Salaries paid	40000
10-1-2019	Cash paid to Madhu	2000

    (b) What are the financial statement   4M

(OR)

10. Define Ratio. Explain various ratios with Du Pont chart   14M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Engineering Geology (CE)

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 following with suitable examples   8M
      (i)petrology   (ii)Structural geology   (iii)Physical geology
   (b) Write about the weathering process of granite rock   6M

(OR)

2. Define Engineering Geology? How the geological drawbacks play a major role in   14M
   construction failures?

UNIT – II

3. What are different methods of Identification of minerals? And explain the methods   14M
   with suitable examples

(OR)

4. Differentiate the following with suitable examples: 14M
   a. Rock forming and ore minerals with examples
   b. Felsic and Mafic Minerals with examples
   c. Streak and Cleavage.

UNIT – III

5. Give an account of different types of rocks among igneous, sedimentary and meta-   14M
   metamorphic groups which occur more frequently and abundantly in nature. Add a
   note   on rock cycle

(OR)

6. Compare and contrast the following pairs with appropriate figures and suitable   14M
   examples:
   (i) Lava and Magma   (ii) Sills and Dykes
   (iii) Plutonic, Hypabyssal and Volcanic rocks.

UNIT – IV

7. Explain the following types of faults with appropriate figures   14M
    (i)Dip – slip   (ii) Reverse   (iii) Oblique slip   (iv)Strike slip

(OR)

8. Explain how the unconformities are formed and types with neat sketch. What is their   14M
   Importance from Civil Engineering of view?

UNIT-V

9. Write on formation, causes and types of earthquakes   14M

(OR)

10. Define the following with suitable examples
    (i)Porosity and Permeability   (ii)Zone of saturation and aeration   14M
    (iii)Cone of depression

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Fluid Mechanics (CE)

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) Define viscosity. What is the difference between dynamic and kinematic viscosities? Mention their units. | 4M
   (b) The surface tension of water in contact with air at 20 ^{0}C is 0.075 N/m. The pressure inside a water droplet is 0.25 kN/m^2 greater than the outside pressure. Calculate the diameter of the water droplet. Derive the equation used. | 10M

(OR)

2. (a) Derive an expression for the capillary rise of a liquid having surface tension σ and contact angle θ between two vertical parallel plates at a distance d apart. If the plates are of glass, what will be the capillary rise if water having $\sigma = 0.073$ N/m; $\theta = 0^o$. Take $d = 1$ mm | 7M
   (b) A rectangular plate of 0.50 m x 0.50 m dimensions and weighing 500 N slides down an inclined plane making 30^0 angle with the horizontal. The velocity of the plate is 1.75 m/s. If the 2 mm gap between the plate and the inclined surface is filled with lubrating oil, find the viscosity of the oil and express it in units of poise. | 7M

UNIT – II

3. (a) Briefly explain about single column monometer with neat sketch. | 7M
   (b) A circular plate of diameter 0.75 m is immersed in a liquid of relative density 0.80 with its plane making an angle of 30^0 with the horizontal. The centre of the plate is at a depth of 1.50 m below the free surface. Calculate the total force on one side of the plate and the location of the centre of pressure. | 7M

(OR)

4. (a) Explain about Micro manometer with the help of a neat sketch. | 7M
   (b) Find the volume of the water displaced and position of center of buoyancy for a wooden block of width 3.0 m and depth 2.0 m, when it floats horizontally in water. The density of wooden block is 6000 N/m^3 and its length 8.0 m. | 7M

UNIT – III

5. (a) Explain about Laminar and Turbulent flow. Give example. | 4M
   (b) Verify whether the following stream functions represent irrotational flow. | 10M
   　　i.　$\Psi = y^2 - x^2$
   　　ii.　$\Psi = A\, x^2\, y^2$

(OR)

6. (a) With the help of neat sketch, explain about stream line, streak line and path line. | 6M
   (b) Draw stream tube and show that stream lines and equipotential lines are orthogonal to each other. | 8M

UNIT – IV

7. (a) The water is flowing through a pipe having diameters 0.3 m and 0.16 m at sections 1 and 2, respectively. The rate of flow through pipe is 0.04 m^3/s. The section-1 is 5 m above the datum and section-2 is 2 m above datum. If the pressure at section 1 is 30 x 10^4 N/m^2, find the intensity of pressure at section 2. | 7M
   (b) An orifice meter consisting of 0.1 m diameter orifice in a 0.25 m diameter pipe has a coefficient 0.65. The pipe delivers oil of specific gravity 0.8. The pressure difference on the two sides of the orifice plate is measured by a mercury oil differential manometer. If the differential gauge reads 0.8 m of mercury, calculate the rate of flow in cumecs. | 7M

(OR)

8. (a) Define Bernoulli's principle and state its assumptions. 4M
   (b) A rectangular air duct has a gradual transition at a 45^0 bend. The inlet is of 1.0 m^2 10M
   cross sectional area and the exit of the transition has a cross section of 0.5 m^2. At the
   inlet, the velocity of flow is 10 m/s and the pressure is 30 kPa. Taking the specific
   weight of air as 0.0116 kN/m^3, determine the magnitude and direction of force
   required to hold the bend in the duct in position. The center line of the bend can be
   assumed to be entirely in the horizontal plane.

UNIT-V

9. (a) Explain about dimensional homogeneity. 4M
   (b) The discharge Q over a small rectangular weir is known to depend upon the head H 10M
   over the weir, the weir height P, gravity g, width of the weir L and fluid properties
   density ρ, dynamic viscosity μ. Express the relationship between the variables in
   dimensionless form.

(OR)

10.   A small sphere of density ρ_s and diameter D settles at a terminal velocity V in a liquid 7M
   (a) of density ρ_f and dynamic viscosity μ. Gravity g is known to be a parameter. Express
   the functional relationships between these variables in a dimensionless form.

       Show that the frictional torque T of a disc of diameter D rotating at a speed of N in a 7M
   (b) fluid of viscosity μ and density ρ in a turbulent flow condition is related as
   $T = D^5 N^2 \rho \phi [\mu / D^2 N \rho]$

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Solid Mechanics - I (CE)

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) Derive the relationship between modulus of elasticity (E), modulus of rigidity (C) and bulk modulus (K) — 7M

   (b) A stepped bar is subjected to external loading as shown in **Fig. Q1 (b)** Determine the magnitude of axial force P such that net deformation in the bar does not exceed 02 mm. E for steel is 200 GPa and that for copper is 100 GPa. Larger diameter and smaller diameters are 40 mm and 15 mm respectively. — 7M
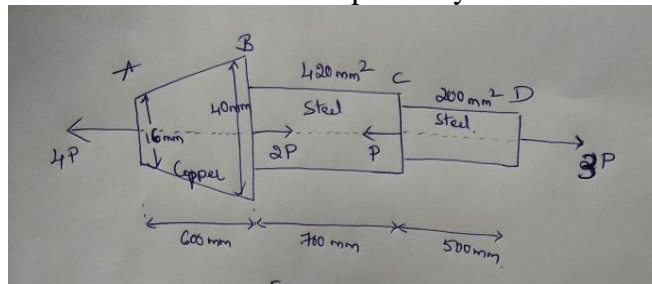
Fig. Q1 (b)

(OR)

2. A bar of 30mm diameter is subjected to a pull of 60kN. The measured extension on guage length of 200mm is 0.1 mm and change in diameter is 0.001 mm. Calculate — 14M
   (i) Young's modulus (ii) Pooisson's ratio and (iii) Bulk modulus

UNIT – II

3. (a) For a simply supported beam subjected to a UDL of intensity w / unit length throughout plot the SFD and BMD and prove that maximum Bending moment is $wl^2/8$ — 7M

   (b) A overhanging beam with roller and hinged supports is as shown in **Fig. Q3 (b).** Draw bending moment and shear force diagrams for given loadings. — 7M
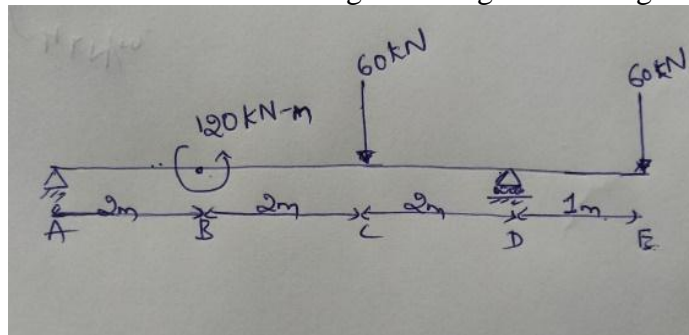
Fig: Q3 (b)

(OR)

4. (a) Draw SFD and BMD for the cantilever beam shown **Fig.Q 4(b).** — 7M
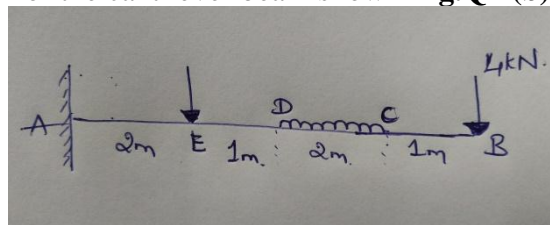
Fig: Q4 (b)

(b) A beam ABC 8m long supported at A and B carries a UDL of 10kN/m. At free end point C, a point load of 15kN acts. Draw SFD and BMD and locate point of contra lecture if any   7M

UNIT – III

5. (a) List the assumptions in theory of simple bending and define : i) Section modulus ii) Modulus of rupture iii. Moment of resistance   6M

   (b) A T - beam with a flange of l 00mm x 20mrn arid with a web of 200mmx100mm is used as simply supported beam over a span of 8m. It carries a UDL of l.5kN/m throughout. Determine the maximum compressive and maximum tensile stresses and plot the variation across the depth of the beam   8M

(OR)

6. The state of stress in a two dimensionally stressed body is as shown in Fig. Q6. Determine the principal planes, principal stresses, maximum shear stress and their planes. Schematically represent these planes on x-y coordinates: 14M
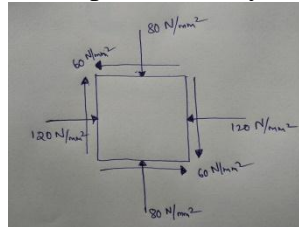
Fig: Q6

UNIT – IV

7. Using Macaulay's method, determine maximum deflection and slope at the supports for the Fig Q 7.   14M
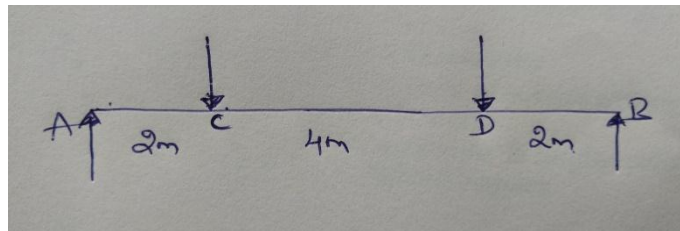
Fig: Q7

(OR)

8. For the figure shown in Q 8, determine maximum deflection, deflection at mid span and slope at A. EI= 4000 kN-m^2. E= 200 x 10^6 kN/m^2 and I= 8 x 10^{-6} m^4 14M
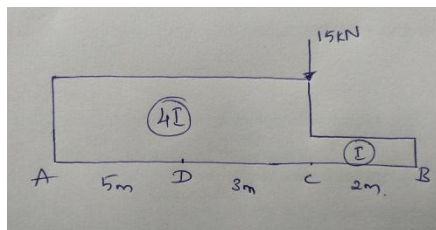
Fig: Q8

UNIT-V

9. (a) Prove that a hollow circular shaft is stiffer and stronger than a solid circular shaft in torsion which have -same material, length and weight.   7M

   (b) Determine the ratio of power transmitted by a hollow shaft and a solid shaft when both have same weight length, material and speed. The diameter of solid shaft is 150 mm and external diameter of hollow shaft is 250 mm.   7M

(OR)

10. Appropriately analyse the spring systems, if they are in: 14M
   (i) Series and
   (ii) parallel

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Disaster Preparedness & Planning Management (CE)

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)	Define the terms vulnerability and risk severity.	7M
	(b)	What are the secondary hazards ?	7M

(OR)

2.	(a)	What are the multiple hazards ?	7M
	(b)	What are the prevention and mitigation activities and projects ?	7M

UNIT – II

3.	(a)	Classify the disasters.	7M
	(b)	Explain the geological disasters.	7M

(OR)

4.	(a)	Briefly discuss any two manmade disasters.	7M
	(b)	Discuss the hazard profile of India.	7M

UNIT – III

5.	(a)	What are the ecological and physical disaster impacts ?	7M
	(b)	Discuss the national disaster trends.	7M

(OR)

6.	(a)	Discuss the hazard locations before disasters occurred.	7M
	(b)	Enumerate the urban disasters.	7M

UNIT – IV

7.	(a)	Explain the Disaster Risk Reduction (DRR).	7M
	(b)	What non-structural measures taken when disasters occurred ?	7M

(OR)

8.	(a)	Briefly discuss the risk analysis, vulnerability and capacity assessment on account of disasters.	7M
	(b)	Discuss the Post-disaster environmental response.	7M

UNIT-V

9.	(a)	What responsibilities of NGOs and other stakeholders when disasters occurred ?	7M
	(b)	Enumerate the activities of National Disaster Management Authority.	7M

(OR)

10.	(a)	What are the Policies taken for disaster risk reduction ?	7M
	(b)	Discuss the DRR programmes in India.	7M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Basic Electrical Engineering (CE- Re Admitted)

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) The capacitance values of three capacitors are 20 µF,40 µF and 60 µF. If these are placed in parallel across a 230 V source, find equivalent capacitance and total charge residing on the capacitors.   7M

   (b) Explain various types of network sources.   7M

(OR)

2. (a) Determine loop currents using mesh analysis.   7M
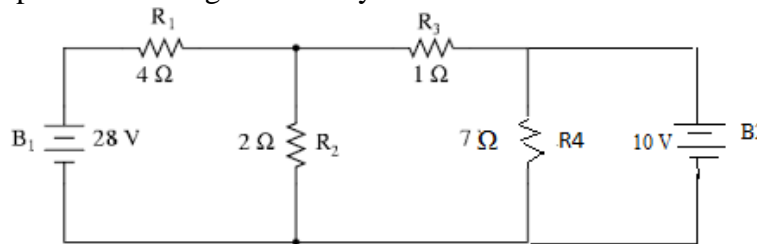
   (b) Explain the transformation of star to delta connection.   7M

UNIT – II

3. (a) Determine the average value of wave shape shown in fig.   7M
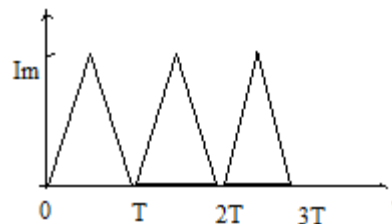
   (b) Define the following i)Form factor, ii) Average value, iii) Peak factor, iv) RMS value   7M

(OR)

4. A 230 V,50 Hz supply is given to the circuit shown in fig. in which the branch impedances are Z1=2+j4 Ω, Z2=2-j4 Ω, Z3=1+j4 Ω and Z4=2+j2 Ω. Determine current flowing through each branch.   14M
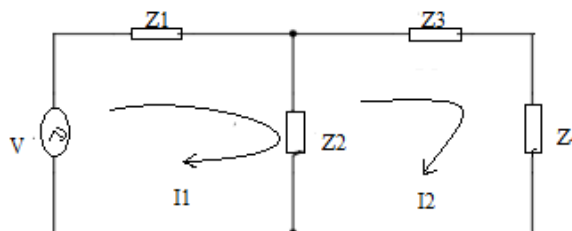
UNIT – III

5. (a) A 6 pole wave wound machine has 200 conductors and runs at 1500 rpm. The flux per pole is 0.015wb. Find induced EMF.   7M

   (b) Derive the expression for EMF induced in a DC generator.   7M

(OR)

6.   (a)   Explain the types of DC Motor.   7M

      (b)   Derive the torque equation in DC motor.   7M

UNIT – IV

7.   (a)   Derive the maximum efficiency condition in single phase transformer.   7M

      (b)   Derive the maximum efficiency condition in single phase transformer.   7M

(OR)

8.   (a)   A three phase induction motor is wound for four poles and supplied from a 50 Hz supply. Calculate a) the synchronous speed and b) the speed of the rotor when the slip is 3%.   7M

      (b)   Explain the basic principle and operation of three phase Induction motor.   7M

UNIT-V

9.   Explain about switch fuse unit (SFU) with neat diagram.   14M

(OR)

10.   Explain about various types of earthling systems.   14M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Electrical Measurements (EEE)

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 construction and working of permanent magnet moving coil instruments   7M
   (b) The inductance of a certain moving-iron ammeter is $\left(8 + 4\theta - \frac{1}{2}\theta^2\right)$ pH, where Θ is the deflection in radian from the zero position. The control spring torque is 12×10^{-6} Nm/rad. Calculate the scale position in radian for current of 5 A.   7M

(OR)

2. (a) How many operating forces are necessary for successful operation of an indicating instrument? Explain the methods of providing these forces.   7M
   (b) A moving coil instrument gives a full-scale deflection of 10mA when the potential across its terminals is 100mV. Calculate shunt resistance for a full-scale deflection corresponding to 100 A.   7M

UNIT – II

3. (a) Describe the constructional details of an electro-dynamometer type wattmeter. Comment upon the shape of scale when spring control is used.   7M
   (b) A 230 V single-phase watthour meter records a constant load of 5 A for 6 hours at unity power factor. If the meter disc makes 2760 revolutions during this period, what is the meter constant in terms of revolutions per unit? Calculate the load power factor if the number of revolutions made by the meter is 1712 when recording 4 A at 230 V for 5 hours.   7M

(OR)

4. (a) Two wattmeters are connected to measure the power consumed by a 3-phase balanced load. One of the wattmeters reads 1500 Ω and the other, 700 Ω. Calculate power and power factor of the load, when (a) both the readings are positive, and (b) when the reading of the second wattmeter is obtained after reversing its current coil connection.   7M
   (b) Explain the construction and working of Moving iron type power factor meter   7M

UNIT – III

5. (a) Describe the working of a Schering bridge for measurement of capacitance and dissipation factor. Derive relevant equations and draw phasor diagram under balanced condition.   7M
   (b) Derive an expression for the unknown resistance measured using the loss of charge method.   7M

(OR)

6. (a) Four arms of a Wheatstone bridge are as follows: AB = 150 Ω, BC = 15 Ω, CD = 6 Ω, DA = 60 Ω. A galvanometer with internal resistance of 25 Ω is connected between BD, while a battery of 20 V dc is connected between AC. Find the current through the galvanometer. Find the value of the resistance to be put on the arm DA so that the bridge is balanced. Derive the expression for the bridge balance.   7M
   (b) Explain how Wien's bridge can be used for measurement of unknown frequency. Draw the phasor diagram under balanced condition and derive the expression for balance.   7M

UNIT – IV

7. (a) Derive expressions for the corresponding ratio error and phase angle error of a current transformer. 7M

   (b) What are the different forms of AC potentiometers and explain anyone them. 7M

(OR)

8. (a) What are the different forms of AC potentiometers and explain anyone them. 7M

   (b) Derive the expressions for Phase angle and ratio errors 7M

UNIT-V

9. (a) Draw and explain construction of Cathode ray tube 7M

   (b) In a CRT, the distance between the deflecting plates is 1.0 cm, the length of the deflecting plates is 4.5 cm and the distance of the screen from the centre of the deflecting plates is 33 cm. If the accelerating voltage supply is 300 volt, calculate deflecting sensitivity of the tube. 7M

(OR)

10. (a) Explain briefly Ramp type DVM 7M

    (b) Explain briefly Successive approximation type DVM 7M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Control Systems (EEE & ECE)

Time: 3 Hours　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

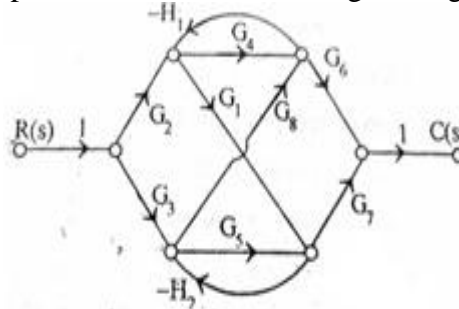**Answer any FIVE Questions choosing one question from each unit.**
All questions carry Equal Marks.

UNIT - I

1. (a) Write the differential equations governing the mechanical rotational system and determine the transfer function of the system.　　7M
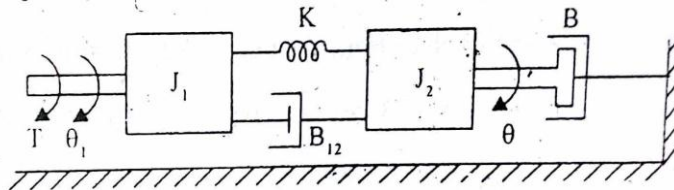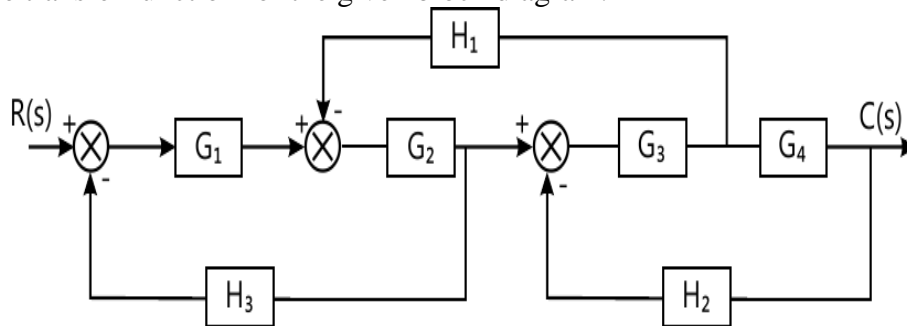

 (b) Determine the closed loop transfer function for the given signal flow graph.　　7M

(OR)

2. (a) Derive the transfer function for armature controlled DC servo motor, with neat diagram.　　7M

 (b) Find the transfer function for the given block diagram.　　7M

UNIT – II

3. (a) Derive the expression for rise time, peak time and peak over shoot and settling time of a second order system subjected to a step input.　　7M

 (b) Calculate the steady stae error constants and steady state errors to the given unity feedback loop transfer function.　　7M
$$G(s) = \frac{10}{s^2(s+1)(s+2)}$$.

(OR)

4. (a) Obtain the unit step response of a unity feedback system whose open loop transfer function is $G(s) = \frac{10}{s(S+10)}$　　7M

 (b) Prove that PD controller will improves the steady state behaviour of the system.　　7M

UNIT – III

5. (a) Construct Routh array and determine the stability of the system whose characteristic equation is $s^6+2s^5+8s^4+12s^3+20s^2+16s+16=0$. Also determine the number of roots lying on right half of s plane, left half of s plane and on the imaginary axis. **7M**

   (b) Sketch the root-locus of the system whose open-loop transfer function is $G(S) = \dfrac{K}{S(S+2)(S+4)}$. Find the value of 'K' so that the damping ratio of the closed loop system is 0.5. **7M**

(OR)

6. (a) Explain the BIBO Stability, Asymptotical stability, Absolute stability, Marginal stability of the system. **7M**

   (b) Sketch the root locus of the system whose open loop transfer function is $G(S) = \dfrac{K}{S(S+1)(S+2)(S+3)}$ **7M**

UNIT – IV

7. (a) Describe the concept of phase margin and gain margin. **7M**

   (b) Sketch the Nyquist plot for $G(s)H(s) = \dfrac{K}{s(s-1)}$. **7M**

(OR)

8. (a) Explain the Nyquist stability criteria with necessary steps. **7M**

   (b) Draw the Bode-plot of the system whose open loop transfer function is $G(s)H(s) = \dfrac{k}{s(1+s)(1+0.1s)(1+0.02s)}$ Determine the value of K for the gain margin of 10dB. **7M**

UNIT-V

9. (a) Draw the Lead compensator circuit and draw bode plot from transfer function. **7M**

   (b) Design a Lead-Lag compensator for the unity feedback system with $G(S) = \dfrac{K}{s(s+1)(s+2)}$ and satisfy the specifications K_V=10 Sec^{-1}, Φ_{PM}=50^0, BW$\geq$ 2 rad/Sec. **7M**

(OR)

10. (a) What is compensation? Why it is needed for control system? Explain the types of compensation. **7M**

    (b) Explain the procedure for lead compensation and lag compensation. **7M**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Electrical Machines - II (EEE)

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) Describe the construction of a 3-phase cage type induction motor with neat sketch.   7M
   (b) How the equivalent circuit parameters are obtained for an induction motor.   7M

(OR)

2. (a) With the help of necessary sketches, explain about No-Load and Blocked rotor tests on a 3-phase induction motor.   7M
   (b) Blocked rotor test on a 3-phase,40 kw,400V,50Hz,6 pole star connected induction motor gave the following data: 200V,110A,p.f=0.4
   Determine the starting torque for a 3 phase voltage of 380V at 45Hz.Neglect magnetizing current and assume stator and rotor ohmic losses equal.   7M

UNIT – II

3. (a) Discuss various speed control techniques that are in use for 3-phase induction motors.   7M
   (b) Discuss the procedure for determining the parameters of equivalent circuit of a single phase induction motor.   7M

(OR)

4. (a) Why 1-phase induction motor is not a self-starting motor? How can we make it to rotate. Explain   7M
   (b) Explain about the construction of a Shaded pole motor. Give some applications of it.   7M

UNIT – III

5. (a) Define and derive the expressions for (i) Pitch factor (ii) Distribution factor   6M
   (b) What is armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator at: (i) u.p.f load   (ii) Zero lagging p.f load   8M
   (iii) Zero leading p.f load, with necessary diagram.

(OR)

6. With necessary diagrams, explain how regulation of an Alternator is determined using ZPF method.   14M

UNIT – IV

7. For a salient pole synchronous machine, derive an expression for power developed as a function of load angle.   14M

(OR)

8. (a) Explain the general procedure for paralleling of alternators. Also mention the advantages of parallel operating alternators.   7M
   (b) Discuss about the load sharing between two alternators connected in parallel.   7M

UNIT-V

9. (a) Why synchronous motor is not a self-starting motor? Explain.   7M
   (b) What is a Synchronous condenser? Explain.   7M

(OR)

10. The full load current of a 3.3 kV Star connected synchronous motor is 160 A at 0.8 lagging pf. The resistance and synchronous reactance of the motor are 0.8 ohm/phase and 5.5 ohms/phase respectively. Calculate the excitation EMF, Torque angle, efficiency and the shaft output power of the Motor. Assume the mechanical stray losses are 30kw.   14M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Power Systems - II (EEE)

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) Derive the expression for A, B, C, D constants for nominal-π method for medium transmission lines.   7M
   (b) Briefly explain following terms: (i) Surge impedance loading (ii) Ferranti effect (iii) Charging current   7M

(OR)

2. (a) Draw the phasor diagram of medium transmission lines represented by a T-model and derive the expression for voltage regulation.   7M
   (b) A short, three-phase transmission line having parameters R=0.4 Ω and X=0.4 Ω is delivering 2000 kVA to a load at a pf of 0.8 lagging at the receiving end of the line. If the load voltage is 3000 V, determine the voltage regulation and efficiency of the line.   7M

UNIT – II

3. (a) What are the steps to be follow to draw Per Unit Impedance/Reactance Diagram   4M
   (b) Draw the PU impedance diagram for the system shown in figure. Choose base values as 200 MVA, 15 kV.   10M
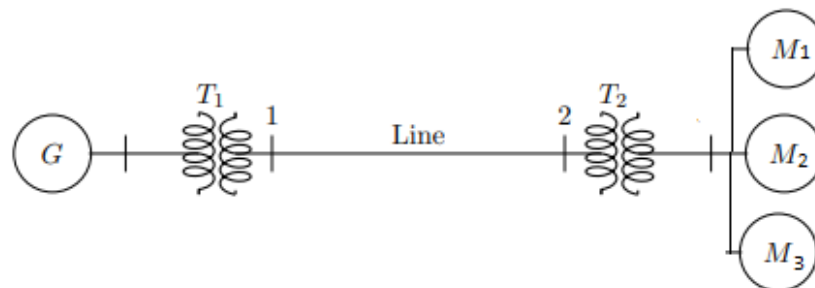
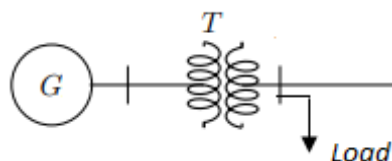G: 150 MVA, 13.2 kV, X = 2 Ω
T$_1$: 100 MVA, 11/121 kV, X = 1 Ω
T$_2$: 100 MVA, 121/5.5 kV, X = 1 Ω
M$_1$: 50 MVA, 3.3 kV, X = 0.6 Ω ; M$_2$: 75 MVA, 3.3 kV, X = 1 Ω; M$_3$: 25 MVA, 3.3 kV, X = 0.3 Ω
Line: 30 Ω

(OR)

4. (a) Define PU system and write the advantages of PU Representation   4M
   (b) For the power system shown in figure, draw the PU reactance diagram by selecting Generator ratings as base values.   10M


G: 200MVA, 11 kV, 10%
T: 25 MVA, 11/33 kV, 10 %
Load: 10 MVA, 33 kV, 0.8 pf lagging

UNIT – III

5. (a) List out the types of reactors and explain any two of them with neat sketch. **6M**

   (b) Selection bus bars A and B are linked by a bus bar reactor rated at 5000 kVA with 10 % reactance. On bus A, there are two generators each of 10,000 kVA with 10 % reactance and B has 2 generators each of 8000 kVA with 12 % reactance. Find the steady MVA fed in to a dead short circuit between all phases on B with bus bar reactor in the circuit. **8M**
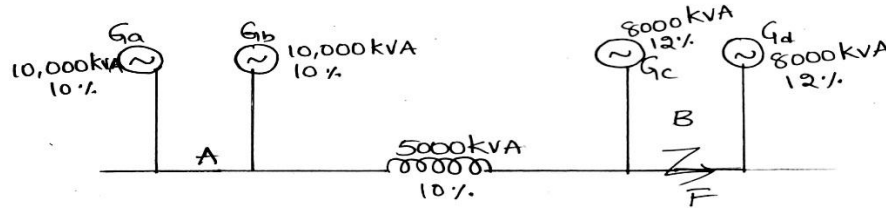
(OR)

6. (a) Derive the expression for Fault MVA in terms of Per Unit and Percentage Quantities. **5M**

   (b) For the radial network shown in figure, a 3-phase fault occurred at F. Determine the fault current and the line voltage al 11-kV bus under fault condition. **9M**
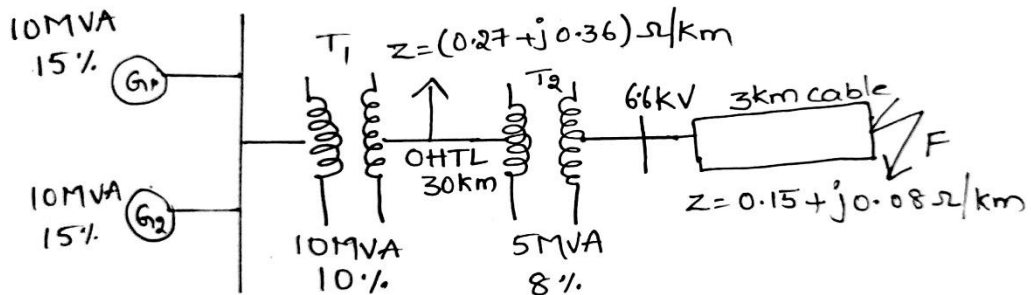
UNIT – IV

7. (a) Derive the expression for fault current in LG fault (without fault impedance). **6M**

   (b) A 25 MVA,13.2 kVA alternator with solidly grounded neutral has a sub transient reactance of 0.25 PU. The negative and zero sequence reactance are 0.35 and 0.1PU respectively. A single line to ground fault occurs at the terminals of unloaded alternator. Determine he fault current and the line to line voltages. Neglect resistance. **8M**

(OR)

8. (a) Explain about sequence impedance of synchronous generator. **7M**

   (b) Derive the expression for fault current and phase voltages in LL fault (with fault impedance) **7M**

UNIT-V

9. (a) Derive the expressions for GS method (PV absent) and write its algorithm. **10M**

   (b) Explain about sparsity and its applications in power flow studies **4M**

(OR)

10. (a) Derive the expressions for all Jacobean elements of N-R method for load flow studies in rectangular coordinates. **10M**

    (b) Write the algorithm of N-R rectangular coordinates method (PV absent) with necessary expressions. **4M**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Applied Thermodynamics (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) Describe with a suitable sketch the two stroke cycle spark ignition engine. How it's indicator diagram differs from that of four stroke cycle engine   7M
   (b) Discuss battery ignition system with a suitable sketch   7M

(OR)

2. (a) How to tell a two stroke cycle engine from a four stroke cycle engine   7M
   (b) The diameter and stroke length of a single cylinder two stroke gas engine, working on the constant volume cycle, are 200mm and 300mm respectively. With clearance volume 2.78 liters. When the engine is running at 135rpm, indicated mean effective pressure was 5.2bar and gas consumption 8.8 m^3/hour if the calorific value of the gas is 16350KJ/m^3. Find i) Air standard efficiency ii) Indicated power developed by the engine iii) Indicated thermal efficiency of the engine   7M

UNIT – II

3. (a) What do you mean by multistage compressor? State its advantages   7M
   (b) A two stage air compressor with complete inter cooling delivers air to the mains at a pressure of 30 bar, suction conditions being 1 bar and 15^0 C. If both cylinders have the same stroke, find the ratio of cylinder diameter for the efficiency of compression of to be maximum. Assume the index of compression to be 1.3   7M

(OR)

4. (a) Prove that the volumetric efficiency of the single stage compressor is given by   7M

$$n_v = 1 + K - K\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} \text{ where } K = \frac{V_c}{V_S}$$

   (b) Distinguish between reciprocating air compressor and rotary air compressor   7M

UNIT – III

5. (a) Explain with a neat sketch the construction and working of Lamont boiler   7M
   (b) The following data were taken during the test on a boiler for a period of one hour. Steam generated 5000kg, coal burnt 700kg, calorific value of coal 31402kj/kg, quality of stream 0.92, if the boiler pressure is 1.2 Mpa and feed water temperature is 45^0 C, find the boiler equivalent evaporating and efficiency   7M

(OR)

6. (a) Distinguish between high pressure boilers and low pressure boilers   7M
   (b) Enumerate various accessories normally used in a steam generating plant   7M

UNIT – IV

7. (a) What do you mean by super saturated flow? Explain with the help of a h-s diagram   7M
   (b) Derive the expression for the mass of steam discharged through a nozzle   7M

(OR)

8. (a) What are the sources of air in the condenser? Explain the effects of air leakage in a condenser.   7M
   (b) Distinguish between jet condenser and surface condenser   7M

UNIT-V

9. (a) Explain velocity compounded impulse stream turbine showing pressure and velocity variations along the axis of the turbine — 7M

(b) In a simple impulse turbine the nozzles are inclined at 20^0 to the direction of motion of the moving blades. The steam leaves the nozzle at 375 m/s. The blade velocity 165 m/s. Calculate suitable inlet and outlet angles for the blades in order that the axial thrust is zero. The relative velocity of the stream as it flows over the blades is reduces by the 15% by friction. Also, determine the power developed by flow rate of 10 kg/s — 7M

(OR)

10. The following data relates to a stage of an impulse reaction turbine. Steam velocity coming out nozzle = 245m/s, nozzle angle = 20^0, the blade mean speed = 145 m/s, speed of rotor = 300 r.p.m, blade height = 10 cm, specific volume of steam at nozzle outlet and blade outlet respectively 3.45 m^3/kg and 3.95 m^3/kg, power developed by the turbine 287 kw, efficiency of the nozzle and blades combindely 90%, carrying over co-efficient 0.82. Find a) heat drop in each stage, b) degree of reaction, c) stage efficiency. — 14M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Fluid Mechanics (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) Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity 1.9.   6M

   (b) A Newtonian fluid in the clearance between a shaft and a concentric sleeve. The sleeve attains a speed of 50 cm/s, when a force of 40N is applied to the sleeve parallel to the shaft. Determine the speed if a force of 200N is applied.   8M

(OR)

2. (a) What are the gauge pressure and absolute pressure at a point 3m below the free surface of a liquid having a density of 1530 kg/m^3 if the atmospheric pressure is equivalent to 750 mm of Hg? The Sp.gravity of mercury is 13.6 and density of water 1000 kg/m^3.   7M

   (b) Explain the working of differential manometer with neat sketch   7M

UNIT – II

3. (a) Derive Continuity equation for one dimensional flow?   8M

   (b) A bend tube in pipe line conveying water gradually reduces from 0.6 m to 0.3 m diameter and deflects the flow through angle of 60^0. At the longer end the gauge pressure is 171.675 KN/m^2. Determine the magnitude and direction of the forces exerted on the bend. 1.When there is no flow 2. When the flow is 876 Lt./s   6M

(OR)

4. Define the equation of continuity. Obtain an expression for continuity equation for a three-dimensional flow.   14M

UNIT – III

5. (a) Obtain the expression for discharge through orifice meter.   6M

   (b) An oil sp.gr. 0.8 is flowing through a venturi meter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturi meter. Take C_d=0.98   8M

(OR)

6. Derive friction factor for the flow through the circular pipe by Darcy Weisbach equation?   14M

UNIT – IV

7. (a) Find the momentum thickness for the velocity distribution in the boundary layer is given by $\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$ 8M

   (b) Define Local Co-efficient of drag and Average Co-efficient of drag   6M

(OR)

8. Derive the expression for Von Karman momentum integral equation for boundary layer flow   14M

UNIT-V

9. Derive Kutta- Joukowski equation.   14M

(OR)

10. (a) What is magnus effect and give dimensional analysis for drag and lift for fluid on a super sonic plane.   6M

    (b) A man weighing 90 kgf descends to the ground from an aero plane with the help of a parachute against the resistance of air. The velocity with which the parachute, which is hemispherical in shape, comes down is 20 m/s. Find the diameter of parachute. Assume C_D=0.5 and density of air is 1.25 kg/m^3.   8M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Kinematics of Machinery (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) Explain the terms i) Lower pair ii) Higher pair iii) Kinematic chain.   4M
    (b) Explain in detail different types of constrained motions.   10M
    (OR)
2. (a) What is a machine? Differentiate between a machine and a structure.   4M
    (b) Sketch and explain the various inversions of a single slider crank chain.   10M

UNIT – II

3. (a) Sketch and explain Harts straight line motion mechanism. Prove that it produces   10M
        an exact straight line motion.
    (b) Sketch a pantograph, explain its working.   4M
    (OR)
4. (a) What are the functions of steering mechanism?   4M
    (b) Sketch and explain Ackerman steering gear mechanism and discus their relative   10M
        advantages.

UNIT – III

5. (a) State and prove Aronhold Kennedys theorem of instantaneous centers   4M
    (b) The crank and connecting rod of a theoretical steam engine are 0.5 m and 2.0 m   10M
        in long   respectively.   The crank makes 200 r.p.m. in the clockwise direction.
        When it has turned 45^0 from the inner dead center position. Determine 1.velocity
        of piston, 2.angular velocity of connecting rod, 3. Velocity of a point E on the
        connecting rod 1.5m from the piston pin, 4. Velocity of rubbing at the pins of the
        crank, crank shaft and cross head when the diameters of their pins are 50mm,
        60mm and70mm respectively.
    (OR)
6.   In the circuit bracket mechanisms represented in figure: 2, the point P moves in a   14M
        vertical straight line. In the configuration O4B is vertical .If the angular velocity
        and angular acceleration of link O4A is 45 rad/sec and 300 rad/sec2 respectively,
        both in clockwise sense. Determine the velocity and acceleration of point P.
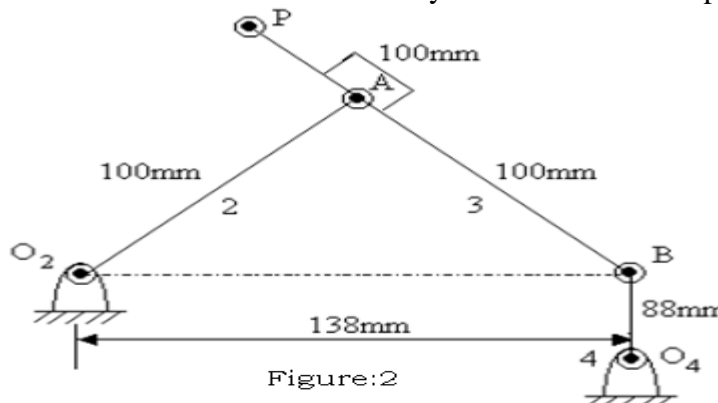

Figure:2

(OR)

UNIT – IV

7. (a) Explain the term i) Base circle ii) Stroke of the follower and iii) Pressure angle. 4M
   (b) Draw and explain the displacement, velocity, and acceleration diagrams for a follower when it moves with uniform acceleration and retardation. 10M

(OR)

8. A cam, with minimum radius of 25mm, rotating clockwise at a uniform speed is to be designed to give a roller follower, at the end of a valve rod, motion described below: 14M

   (i) to raise the valve through 50mm during 120^0 rotation of the cam

   (ii) to keep the valve fully raised during next 30^0

   (iii) to lower the valve during next 60^0 and

   (iv) to keep the valve closed during rest of the revolution

   The diameter of the roller is 20mm and the diameter of the cam shaft is 25mm.Draw the profile of the cam when the line of stroke of the valve rod passes through the axis of the cam shaft.

UNIT-V

9. (a) Explain the terms i) Circular pitch,ii) Module and iii) Length of path of contact 4M
   (b) Two involutes gears of 20 degree pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find: 1. the angle turned through by pinion when one pair of teeth is in mesh, and 2. the maximum velocity of sliding. 10M

(OR)

10. In an epi-cyclic gear train, as shown in figure: 1, the number of teeth on wheels A, B, and C are 50, 25, and 52 respectively. If the arm rotates at 420rpm clockwise, find: 14M

    (i) Speed of wheel C when A is fixed, and
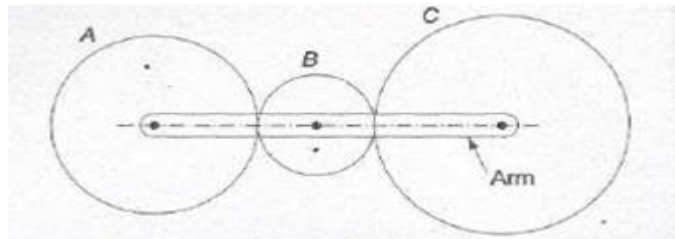
    (ii) Speed of wheel A when C is fixed

Figure:1

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Instrumentation and Control Systems (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. Explain i) Range and span ii) Resolution iii) Calibration iv) Sensitivity   14M

(OR)

2. (a) Distinguish between accuracy and precision.   7M
    (b) Define the term linearity, reproducibility, repeatability and calibration.   7M

UNIT – II

3. (a) Explain the various inductive transducers used for the measurement of displacement.   7M
    (b) Explain the various arrangements of manometers for pressure measurement.   7M

(OR)

4. (a) Explain the construction and working of liquid in gas thermometer.   7M
    (b) Explain the working principle of Bellows pressure gauge with a neat sketch   7M

UNIT – III

5. (a) Explain the capacitive methods of level measurement.   7M
    (b) Explain the mechanical methods of measurement of vibrations.   7M

(OR)

6. (a) With neat sketch, explain the operation of magnetic flow meter   7M
    (b) Explain the mechanical tachometer with neat sketch.   7M

UNIT – IV

7. (a) Explain the foil strain gauge stating its advantages.   7M
    (b) Derive the expression of a gauge factor of a strain gauge.   7M

(OR)

8. (a) Explain bonded and unbonded resistance wire strain gauge.   7M
    (b) Write a note on semiconductor strain gauge.   7M

UNIT-V

9. (a) Explain how the humidity is measured by sling type hygrometers.   7M
    (b) What are load cells? Explain the working of strain gauge load cell with a neat diagram.   7M

(OR)

10. Discuss the various types of dynameters used for the force measurement.   14M

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March – 2021
SUB: Probability Theory and Stochastic Processes (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) Define the term Probability. Explain the axiomatic probability and prove any three   7.0 M
         theorems.
    (b) A company sells high fidelity amplifiers capable of generating 10, 25 and 50 W of   7.0 M
         audio power. It has on hand 100 of 10 W units, of which 15% are defective,70 of the
         25 W units with 10% defective, and 30 of the 50 W units with 10% defective)What is
         the probability that an amplifier sold from the 10 W unit is defective ? ii) If each
         wattage amplifier sells with equal likelihood, what is the probability of randomly
         selected unit being 50W and defective? and iii) What is the probability that a unit
         randomly selected for the sale is defective?

(OR)

2. (a) The number of cars arriving at certain bank drive-in window during any time period is   7.0M
         a poisson random variable X with b=2. Find i) The probability that more than 3 cars
         will arrive during any 10 minute time period and ii) the probability that no car will
         arrive.
    (b) A random variable X has the probability density function $f_X(x) = {}^c/_{x^2+1}$ where   7.0M
         - ∞< x<∞. Find i) the value of constant 'c' and ii) the probability that X^2 lies between
         1/3 and 1.

UNIT – II

3. (a) A random variable X has the density function $f_X(x) = \begin{cases} \frac{5(1-x^4)}{4} & ,0 < x < 1 \\ 0, & elsewhere \end{cases}$.

         Find i) E[X] ii) E[4X+2] iii) E[X^2] and iv) Variance.   8.0M

    (b) State and prove the Chebyshev's inequality.   6.0 M

(OR)

4. (a) Show that the characteristic function of a Poisson random variable X is   6.0M
         $\Phi_X(\omega) = exp[-b(1 - e^{j\omega})]$.
    (b) Explain the transformation of a continuous random variable.   8.0M

UNIT – III

5. (a) Given the function $f_{XY}(x,y) = \begin{cases} b(x+y)^2 & -2 < x < 2 \ and -3 < y < 3 \\ 0 & elsewhere \end{cases}$ .i) Find   8.0M
         the constant 'b' such that this is a valid joint density function. Ii)Determine the
         marginal density functions $f_X(x)$ and $f_Y(y)$.

    (b) A joint density function is $f_{XY}(x,y) = \begin{cases} 1/ab & 0 < x < a \ and \ 0 < y < b \\ 0 & elsewhere \end{cases}$. If   6.0M

         a < b, find i) $P(X + Y \le \frac{3a}{4})$ and ii) $P(Y \le \frac{2bX}{a})$.

6. (a) Two random variables X and Y have the joint characteristic function, defined by 7.0M
$\Phi_{XY}(\omega_1, \omega_2) = e^{(-2\omega_1^2 - 8\omega_2^2)}$ Then, show that X and Y are both zero mean random variables and are uncorrelated.

(b) Two statistically independent random variables X and Y have mean values E[X]=2 7.0M and E[Y]=4.They have second moments E[X^2]=8 and E[Y^2]=25.Find i) the mean value ii)the second moment and iii) the variance of the random variable W=3X − Y.

UNIT – IV

7. (a) Explain Gaussian and Poisson Processes. 6.0M

(b) Show that the random process $X(t) = A\ Cos(\omega t + \theta)$ Is Wide Sense Stationary if it 8.0M is assumed that A and ω are constants and θ is uniformly distributed random variable on the interval (0,2π).

(OR)

8. (a) Derive the relation between power spectral density and auto correlation function. 6.0M

(b) Auto Correlation Function of a random process X(t) is $R_{XX}(t) = 3 + 2\ e^{-4T^2}$. Find 8.0M (i).Power Spectrum of X(t) (ii).What is the average power in X (t) ? and (iii). What fraction of the power lies in the frequency band $\frac{-1}{\sqrt{2}} \leq \omega \leq \frac{1}{\sqrt{2}}$?

UNIT-V

9. (a) Deduce the relation between power spectral densities of input and output random 7.0M processes of an LTI system.

(b) A stationary random process X (t), having an autocorrelation 7.0M function $R_{XX}(\tau) = 2\ exp(-4|\tau|)$ is applied to network of figure shown below. Find i) $S_{XX}(\omega)$ ii)$|H(\omega)|^2$ and iii) $S_{YY}(\omega)$.
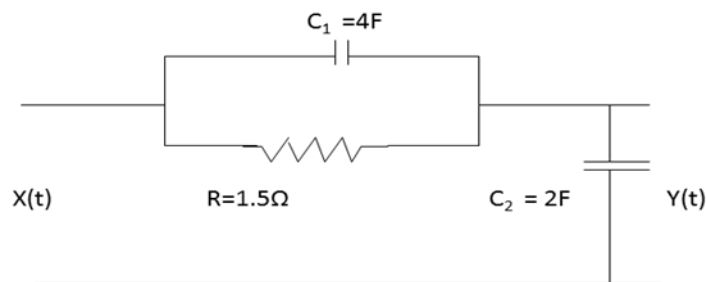
(OR)

10. (a) Explain the relationship between the cross-correlation function and the cross power 7.0M spectral density.

Find the Noise Bandwidth of the system having the power transfer function 7.0M

(b) $[H(\omega)]^2 = \dfrac{1}{\left[1+\left(\left(\frac{\omega}{W}\right)^2\right)\right]^2}$, where W is positive real constant.

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Supplementary Examinations of March/April – 2021
SUB: Analog and Digital Circuits (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) Define f_β and f_T. Derive the relation between f_β and f_T.   7M
   (b) In a certain BJT transistor $r_{\pi} = 4$ kΩ and $\beta = 200$ at 2 MHz and $\beta = 10$ at 20 MHz, then determine the valves of f_β, f_T and C_{π}.   7M

(OR)

2. (a) Illustrate the high frequency model of FFT.   5M
   (b) Derive the expressions for voltage gain, input admittance and output admittance for CD-FET at high frequencies.   9M

UNIT – II

3. (a) What are the factors that affect low and high frequency response of a RC coupled amplifier?   8M
   (b) Classify different types of amplifiers.   6M

(OR)

4. (a) Analyze the criterion for the choice of amplifier configurations in cascade amplifier.   7M
   (b) Demonstrate the bootstrapping principle in emitter follower circuit.   7M

UNIT – III

5. (a) Draw and classify the different types of feedback amplifier topologies.   7M
   (b) A voltage series negative feedback amplifier has a voltage without feedback = 500, input resistance = 3 kΩ, output resistance = 20 kΩ, feedback ratio $\beta = 0.01$. Calculate the voltage gain, input resistance and output resistance of the amplifier with feedback.   7M

(OR)

6. (a) Draw the circuit diagram of Wien-bridge oscillator and explain its operation.   7M
   (b) In a transistorized Hartley oscillator, the two inductances are 10 µH and 1 mH while the frequency is to be changed from 900 kHz to 2000 kHz. Calculate the range over which the capacitor is to be varied.   7M

UNIT – IV

7. (a) Derive the expression for power output and conversion efficiency of a Class-A power amplifier.   7M
   (b) Demonstrate the working principle of a push-pull amplifier with the help of a circuit diagram and list out its advantages.   7M

(OR)

8. (a) Discuss the effects of cascading tuned amplifiers on bandwidth.   7M
   (b) A tank circuit has a capacitor of 100 pF and an inductance of 100 µH. The resistance of inductor is 5Ω. Determine the (a) resonance frequency, (b) impedance at resonance, (c) Q- factor, and (d) bandwidth.   7M

UNIT-V

9. (a) Define negative logic. Draw and explain the operation of NOT and OR gates using Diode negative logic.   7M
   (b) List out the advantages and disadvantages of DCTL gates.   7M

(OR)

10. (a) Write a brief note on ECL and IIL logic families.   7M
    (b) Draw the circuit of an RTL gate and explain its operation for positive logic.   7M