Q.P. Code: 1804405 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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 circuit diagram of dual input balanced output differential amplifier and derive the expression for voltage gain	8M
	(b)	What is an operational amplifier? List out the ideal characteristics of operational amplifier	6M
		(OR)	
2.	(a)	List out the Four differential amplifier circuit configurations and draw their circuit diagrams	6M
	(b)	Explain the following parameters: (i)Input offset voltage (ii) Input offset current (ii) Input bias current (iv) Slew rate	8M

UNIT – II

3.	(a)	Explain the operation of V to I and I to V converter by deriving the necessary equations.	8M
	(b)	Draw the circuit diagram of basic differential amplifier using op-amp .Derive the expression for output voltage.	6M
		(OR)	
4.	(a)	Draw the circuit diagram of sample and hold circuit. Explain its operation	6M
	(b)	Derive an expression for the output voltage of an instrumentation amplifier (3 OP-AMP & 7 resistor circuit)	8M

UNIT – III

5.	(a)	Design a first order LPF at a cutoff frequency of 1KHz with a pass band gain of 2.	6M
	(b)	Explain the operation of Schmitt trigger using op-amp and derive the equation for hysteresis voltage.	8M
		(OR)	
6.	(a)	Design the square wave generator using op-amp to operate at a frequency of 1KHz. The op-amp is IC 741 with supply voltages = $\pm 15v$	7M
	(b)	Draw the circuit diagram of general second order filter and derive the expression for transfer function of it.	7M

UNIT – IV

7.	(a)	Design a Monostable Multivibrator using 555 timer to produce a pulse width of 10msec	6M
	(b)	Explain the following (i) PLL used as Frequency translation (ii) PLL used as Frequency multiplier	8M
		(OR)	
8.	(a)	Draw the circuit diagram of Schmitt trigger using 555 timer and explain its operation	7M
	(b)	Draw the block schematic of the PLL and explain the function of each block in it.	7M

UNIT-V

9.	(a)	Explain the operation of Dual slope integrating ADC	7M
	(b)	Draw the circuit diagram of 4-bit weighted resistor DAC and derive the expression for output voltage.	7M
		(OR)	
10.	(a)	Draw the functional diagram of the Successive approximation ADC and explain its operation	7M
	(b)	With the necessary circuit diagram , explain the operation of Inverted R-2R ladder DAC	7M

Q.P. Code: 1804406 | **SET - 1**

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

B. Tech. IV Sem. (R18) Regular Examinations of November - 2020

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) Obtain the relation between electric field, E and Scalar potential, V. 6M
Let V = $x^2 y(z+3)$ v. Find E at (3,4,-6)

(b) Derive an expression for the electric field intensity due to infinite sheet charge in the xy-plane with uniform charge density ρ_s 8M

(OR)

2. (a) Given that $D = z\rho\cos^2\phi \ \ a_z \text{ C/m}^2$, Calculate the charge density at $(1, \pi/4, 3)$and the total charge enclosed by the cylinder of radius 1m with $-2 \le z \le 2\text{ m}$ 7M

(b) Derive an expression for capacitance of a parallel plate capacitor 7M

UNIT – II

3. (a) Obtain the expression for magnetic field intensity at any point in free space due to a infinite long current carrying conductor using Biot-Savart's law 7M

(b) Given the magnetic vector potential $A = -\left(\frac{\rho^2}{4}\right)a_z Wb/m,$ calculate the total magnetic flux crossing the surface $\phi = \pi/2, 1 \le \rho \le 2m, 0 \le z \le 5m$ 7M

(OR)

4. (a) Obtain the expression for force between two current elements 7M

(b) Plane $y = 1$ carries current $K = 50a_z A/m$. Find H at (i) (0,0,0) (ii) (1,5,-3) 7M

UNIT – III

5. (a) State and explain Faraday's law of electromagnetic induction 7M

(b) Given that $D = 50a_x + 80a_y - 30a_z nC/m^2$ in region $x > 0$ where $\varepsilon = 2.1\varepsilon_0$, find D in region $x < 0$ where $\varepsilon = 7.6\varepsilon_0$ 7M

(OR)

6. (a) Write Maxwell's equations for time varying fields in different final forms and give their word Statements 8M

(b) Given that $E = E_0\cos(wt - \beta z)a_x \ V/m$ in free space, determine D, H and B 6M

UNIT – IV

7. (a) Derive the wave equation in E and H for time varying fields 8M

(b) An EM wave in free space is described by $H = 0.4\cos(10^8 t + \beta y)A/m$. 6M
Determine (a) the angular frequency w (ii)the wave number β
(iii) the wave length λ (iv) the direction of the wave propagation

(OR)

8. (a) Discuss about the propagation of uniform plane waves in good conductors and deduce the expression for intrinsic impendence and skin depth 8M

(b) The plane wave E = 30 $\cos(wt - z)a_x$ V/m in air normally hits a lossless medium $(\mu = \mu_0, \varepsilon = 4\varepsilon_0)$at Z = 0. Find (i) Reflection coefficient (Γ) 6M
(ii) Transmission coefficient (τ) and (iii) Standing wave ratio (s)

UNIT-V

9. (a) Explain about various types of transmission lines and draw their schematic diagrams 6M

(b) A telephone line operating at 1KHz has R = $6.8\,\Omega/m$, L = $3.4\,mH/m$, C = $8.4\,nF/m$, and G = $0.42\,\mu S/m$ Find the characteristic impedance and propagation constant 8M

(OR)

10. A lossless transmission line with Z_0 = 50 Ω Operates at 2MHz .The line terminated

(a) with a load $Z_L = 60 + j40\ \Omega$. Using a smith chart, determine the reflection coefficient and the standing wave Ratio 7M

(b) Derive an expression for characteristic impedance of transmission line 7M

Q.P. Code: 1805403 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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)	Explain about various types of computers	7M
	(b)	Write about bus structure in detail	7M
		(OR)	
2.	(a)	Discuss about basic performance equation	7M
	(b)	Explain about Fixed point representation in detail.	7M

UNIT – II

3.	(a)	What is Three state bus buffers?	7M
	(b)	List out types of logical micro operations and explain	7M
		(OR)	
4.		Draw a neat sketch of arithmetic logic shift unit and explain about it in detail	14M

UNIT – III

5.	(a)	What are Computer instructions?	7M
	(b)	Write a short note on Memory reference instructions	7M
		(OR)	
6.	(a)	Explain the design of control unit	7M
	(b)	Construct Booth Multiplication Algorithm and explain with an example	7M

UNIT – IV

7.	(a)	Define Pipelining. Discuss about arithmetic pipeline.	7M
	(b)	Explain about RISC Pipeline	7M
		(OR)	
8.		How Cache memory is helpful in improve system performance? Explain	14M

UNIT-V

9.		Summarize the following (a) Input- Output Interface (b) Asynchronous data transfer	14M
		(OR)	
10.	(a)	Explain about Interprocessor Arbitration	7M
	(b)	Justify the usage of Direct memory Access	7M

Q.P. Code: 1805404 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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) What is OS? Explain in detail about various functions of OS. 7M
   (b) Explain in detail about distributed systems. 7M

(OR)

2. Explain in detail about operating system services and system calls with examples. 14M

UNIT – II

3. (a) Explain in detail about process and process states with a neat sketch. 7M
   (b) Assume you have the following jobs to execute with one processor, with the jobs arriving in the order listed here: 7M

i	T(pi)	Priority
0	10	3
1	1	1
2	2	4
3	1	5
4	5	2

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

(OR)

4. (a) Explain in detail about the critical-section problem and Peterson's solution. 7M
   (b) Explain in detail about monitors and its implementation. 7M

UNIT – III

5. Illustrate and explain in detail about paging and the structure of page table with example. 14

(OR)

6. Explain the need of page replacement. Consider the following reference string 1,2,3,4,1,2,5,1,2,3,4,5 for a memory with three frames. How many page faults would LRU and FIFO replacement algorithm? Which algorithm gives the minimum number of page faults? 14M

UNIT – IV

7. Describe briefly about Deadlock and its characteristics. Explain the methods to prevent from deadlock. 14M

(OR)

8. (a) Define a file system. What are various components of a file system? State and explain various file allocation methods. 7M
   (b) What problems could occur of system allowed a file system to be mounted simultaneously at more than one location? 7M

UNIT-V

9. (a) Explain briefly protection and the goals of protection. 7M
   (b) Explain in detail about implementation of access matrix. 7M

(OR)

10. Explain the security attacks on operating system. Write the steps to protect the computer system from various attacks. 14M

Q.P. Code: 1805405 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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.	(a)	Explain the various criteria used for analyzing algorithms?	7M
	(b)	List the properties of various asymptotic notations?	7M

(OR)

2.		Write an algorithm to find mean and variance of an array perform best, worst and average case complexity, defining the notations used for each type of analysis?	14M

UNIT – II

3.	(a)	Explain about Strassen‘s Matrix Multiplication with example?	7M
	(b)	Explain Knapsack Problem with example?	7M

(OR)

4.	(a)	Write and analyze the Prim‘s Algorithm. How do you construct a Minimum cost spanning tree using Kruskal‘s Algorithm?	7M
	(b)	Explain Knapsack Problem with example?	7M

UNIT – III

5.		Describe the Traveling salesman problem & 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.		What is Backtracking? Explain in detail?	14M

(OR)

8.	(a)	Write short notes on (a) Graph coloring	7M
	(b)	(b) 8-Queens problem	7M

UNIT-V

9.		Discuss the solution for knapsack problem using branch and bound techniques?	14M

(OR)

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

Q.P. Code: 1805406 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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)	List and explain the principles of OOP concepts	7M
	(b)	Develop a java program to find the series of even numbers	7M
		(OR)	
2.	(a)	Define classes and objects with examples?	5M
	(b)	Define Method? Explain the concept of constructor with example?	9M

UNIT – II

3.	(a)	Define Inheritance and explain the types of inheritance with examples?	7M
	(b)	Define Abstract class? Explain about polymorphism in detail?	7M
		(OR)	
4.	(a)	Define Package? Explain in detail about accessing a Package?	7M
	(b)	Write a Java Program to find square root of a number using packages.	7M

UNIT – III

5.	(a)	Explain exception handling? Write in detail about exception handling hierarchy?	7M
	(b)	Define Thread? Explain Thread Life Cycle?	7M
		(OR)	
6.	(a)	Differentiate among Multithreading and Multitasking?	7M
	(b)	Write a Java Program that demonstrates Thread Priorities	7M

UNIT – IV

7.	(a)	Explain AWT Hierarchy?	5M
	(b)	Write a Java Program that implements Mouse events?	9M
		(OR)	
8.	(a)	Write a Java Program that implements Keyboard events?	9M
	(b)	Discuss Gridbag Layout with an example.	5M

UNIT-V

9.	(a)	Define Applet? Explain the Life cycle of an Applet?	7M
	(b)	Explain JApplet and JComponent in Swings?	7M
		(OR)	
10.	(a)	Differentiate between Applets and Applications	5M
	(b)	Create a Combo Box in Java using swings	9M

Q.P. Code: 1805407 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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) a) Construct a Deterministic Finite State Automata equivalent to the NFA given below M={(q0,q1), {a,b,c} ,δ, q0, { q1}} where δ is defined by the following transition table — 10M

δ	a	b	c
q0	(q0,q1)	(q1)	null
q1	null	(q0,q1)	(q1)

(b) Prove that for every NFA accepting a language L there exists an equivalent DFA accepting the same language L . — 4M

(OR)

2. (a) Construct NFA without Є moves for the following transition table — 8M

	0	1	Є
q0	ϕ	ϕ	{ q0, q1, q2}
q1	{q1}	{q3}	ϕ
q2	{q3}	{q2}	ϕ
q3	ϕ	ϕ	ϕ

where q3 is the final state and q0 is the start state.

(b) State and explain the differences between Moore and Mealy Machine? — 6M

UNIT – II

3. (a) Construct the regular grammar to generate the following Language L={ a^{2n-1} | n ≥1}. — 6M
(b) Construct an NFA equivalent to the regular expression (ab+aba)*. — 8M

(OR)

4. (a) Convert the regular expression (((00)*(11)) + 01)* into an NFA — 8M
(b) Prove that the following language L is not regular using pumping lemma — 6M
L = { w belongs to {a, b}* | w = w^R }

UNIT – III

5. (a) Prove that all context free languages are not closed under intersection — 7M
(b) Prove that complement of recursive language is recursive? — 7M

(OR)

6. (a) Construct Griebach Normal Form Equivalent to the context free grammar — 10M
S->ASB/AB, A->a, B->b
(b) Define Ambiguous Grammar? Check whether the grammar S->aAB, A->bC/cd, C->cd, B-> c/d Is Ambiguous or not? — 4M

UNIT – IV

7. (a) Explain two stack PDA with an example. — 4M
(b) Construct PDA for the language L={a^nb^n ,n>=1} — 10M

(OR)

8. (a) Design PDA for **L={a^nb^n, n>=1}** and test the acceptance of the string **w=aabb** by using (i)Final State Method (ii) Empty Stack Method — 10M
(b) Write short notes on LBA — 4M

UNIT-V

9. (a) Draw a transition diagram for Turing machine and explain it in detail? — 4M
(b) Design a Turing Machine to accept the set of all palindrome over {0,1}*. Draw the Transition diagram for the same. — 10M

(OR)

10. (a) Construct a Turing Machine for language L = {ww^R | w ∈ {0, 1}}. — 9M
(b) Explain in detail about P, NP, NP-complete and NP-hard problems with real time examples for each. — 5M

Q.P. Code: 1814402 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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) Classify Binary codes and explain each code with example. 10M
   (b) Perform decimal subtraction in BCD by the 9's complement on 305.5-168.8 4M

(OR)

2. (a) Convert the following numbers 6M
   i) $(B9F.AE)_{16} = (?)_8$ (ii) $(2598.675)_{10} = (?)_{16}$ (iii) $(?)_{10} = (10100011.111)_2$
   (b) List and describe briefly about number systems. 8M

UNIT – II

3. (a) Reduce the expression f=∑m(0,2,3,4,5,6) using K-map and implement it in AOI logic. 8M
   (b) Draw the logic symbols, construct truth tables and with the help of circuit diagram explain the working of the following gates. 6M
   i) X-OR (ii) X-NOR

(OR)

4. (a) Obtain the compliment of the following Boolean expressions 6M
   i) A′B+A′BC′+A′BCD+A′BC′D′E
   ii) ABEF+ABE′F′+A′B′EF.
   (b) Differentiate between a prime implicants and a non- prime implicants, and an essential prime implicants and Non-essential prime implicants. 8M

UNIT – III

5. (a) Distinguish between a serial adder and parallel adder. 4M
   (b) Design a 4-bit binary to gray code converter. 10M

(OR)

6. (a) Realize a Half-Subtractor using only 2-input NAND gates. 7M
   (b) Design a 4-bit Gray to Binary code converter. 7M

UNIT – IV

7. (a) Explain the differences between ring and Johnson counters. Design and explain the operation of a decade Johnson counters. 10M
   (b) Distinguish between mealy model and Moore model with logic diagram. 4M

(OR)

8. (a) Give the Comparison between combinational and sequential circuits. 4M
   (b) Obtain the characteristic equations of JK, SR, D and T flip-flops. Also explain excitation tables of all these flip-flops. 10M

UNIT-V

9. (a) Derive the PLA programming table for the combinational circuit that squares a 3-bit number. 7M
   (b) Write short notes on FPGAs 7M

(OR)

10. (a) Design a combinational circuit using PROM that accepts 3-bit binary number and generates its equivalent excess-3 code. 7M
    (b) Explain in detail about the programming table of PLDs. 7M

Q.P. Code: 1814404 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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 semiconductor diode? Explain different equivalent circuits of diode? 8 M
   (b) Explain the working of photo diode? 6 M

(OR)

2. (a) Explain the working of full wave rectifier with neat diagrams and waveforms. 8 M
   (b) Show that efficiency of full wave rectifier is 81%. 6 M

UNIT – II

3. (a) What is transistor? Explain types of transistors along with applications. 6 M
   (b) Draw the common emitter circuit, sketch the input and output characteristics and explain three regions of operations. 8 M

(OR)

4. (a) Explain how transistor acts as switch with neat diagram. 6 M
   (b) Draw the circuit diagram of Voltage divider basing circuit, derive the expression of I_B and $V_{CE.}$ 8 M

UNIT – III

5. (a) Explain the basic structure and operation of JFET with neat diagram. 10M
   (b) For a N-channel JFET if I_{DSS} =8mA and Vp= -5V , Calculate I_D at V_{GS}= -3V. 4 M

(OR)

6. (a) Draw the basic structure of an N-channel JFET, Show its circuit symbol. How is it different from BJT. 7 M
   (b) Explain how JFET act as Switch and Amplifier. 7 M

UNIT – IV

7. (a) Explain the principle of phase shift oscillator. 6 M
   (b) Draw the circuit diagram of RC phase shift oscillator and explain its working. 8 M

(OR)

8. (a) Explain working principle, circuit and operation of crystal oscillator. 8 M
   (b) The ac equivalent circuit of a crystal has these values: L= 1H, C= 0.01pF, R=1000Ω and C_m=20pF. Calculate series resonant (f_s) and Parallel resonant(f_p) frequency of the crystal. 6 M

UNIT-V

9. (a) Explain the working principle of digital voltmeter and Integrating Voltmeter. 8M
   (b) Discuss the principle of Cathode Ray Tube. 6M

(OR)

10. (a) Discuss about Magnetic Deflection. 4 M
    (b) Explain the measurement of voltage and current using CRO with neat diagram. 10M

Q.P. Code: 1821401 | **SET - 1**

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

B. Tech. IV Sem. (R18) Regular Examinations of November - 2020

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. (a) Prove that $\frac{d}{dx}\left[x^n J_n(x)\right] = x^n J_{n-1}(x)$ 7M

   (b) Prove that $\frac{d}{dx}\left[x^{-n} J_n(x)\right] = -x^{-n} J_{n+1}(x)$ 7M

(OR)

2. To Show $(1-2xt+t^2)^{-1/2} = P_0(x) + P_1(x)t + P_2(x)t^2 + ---$ 14M

UNIT – II

3. S.T the function $U(x,y) = e^x \cos y$ is harmonic. Determine its harmonic conjugate $V(x,y)$ and the analytic function. 14M

(OR)

4. Find $f(z) = U + iV$ given that $U + V = \frac{\sin 2x}{\cosh 2y - \cos 2x}$ 14M

UNIT – III

5. (a) Find the bilinear transformation which maps the points $\infty, i, 0$ in the Z-plane into $-1, -i, 1$ in the w-plane. 9M

   (b) Find the fixed points of the transformation $w = \frac{2i-6z}{iz-3}$ 5M

(OR)

6. Discuss the transformation $w = e^z$ 14M

UNIT – IV

7. Verify Cauchy's theorem for the integral of z^3 taken over the boundary of the rectangle with vertices $-1, 1, 1+i, -1+i$ 14M

(OR)

8. (a) Evaluate,using Cauchy's integral formulae $\int_c \frac{\log z}{(z-1)^3} dz$ where C is $|z-1| = \frac{1}{2}$ 7M

   (b) Evaluate $\int_c \frac{e^z}{z(z+1)} dz$ where C is circle $|z-1| = 3$ 7M

UNIT-V

9. (a) Evaluate $\int_C \frac{Sin\pi z^2 + Cos\pi z^2}{(z-1)^2(z-2)} dz$ Where C is the circle $|z| = 3$ 7M

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

(OR)

10. (a) Evaluate $\int_{-\infty}^{\infty} \frac{e^{ax}}{e^x + 1} dx$ 14M

Q.P. Code: 1821402 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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. Two dice are thrown. Let X assign to each point (a,b) in S the maximum of its numbers *i.e.*, $X(a,b)=\max(a,b)$. Find the probability distribution, where X is a random variable with $X(s)=\{1,2,3,4,5,6\}$. Also find the mean and variance of the distribution. 14M

(OR)

2. (a) If X is a continuous random variable and k is a constant then prove that $\text{var}(X+k)=\text{var}(X)$. 7M

(b) A continuous random variable X has a p.d.f $f(x)=kx^2e^{-x}, x\geq 0$. Find k, mean and variance. 7M

UNIT – II

3. (a) Fit a Binomial distribution to the following frequency distribution: 7M

x	0	1	2	3	4	5
f	2	14	20	34	22	8

(b) A car-hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days (i) on which there is no demand (ii) on which demand is refused. 7M

(OR)

4. Fit a Normal distribution to the following frequency distribution and hence find the theoretical frequencies. 14M

x	2	4	6	8	10	Total
f	1	4	6	4	1	16

UNIT – III

5. (a) The mean breaking strength of the cables supplied by a manufacturer is 1800, with a standard deviation of 100. By a new technique in the manufacturing process, it is claimed that the breaking strength of the cable has increased. To test this claim, a sample of 50 cables is tested and it is found that the mean breaking strength is 1850. Can we support the claim at 1% LOS? 7M

(b) In a large city A, 20% of a random sample of 900 school boys had a slight physical defect. In another large city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant? 7M

(OR)

6. (a) A cubical die is thrown 9000 times and a throw of 3 or 4 is observed 3240 times. Show that the die cannot be regarded as an unbiased one, and find the extreme limits between which the probability of a throw of 3 or 4 lies. 7M

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

UNIT – IV

7. (a) The mean weakly sale of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful? 7M

   (b) Two samples of sizes 9 and 8 gave the sums of squares of deviations from their respective means equal to 160 and 91 respectively. Can they be regarded as drawn from the same normal population? 7M

(OR)

8. From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees. 14M

Employees / Soft Drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

UNIT-V

9. The following are the values of mean $\overline{X}$ and range R for 10 sub groups of 5 readings each taken from an inspection. Draw the $\overline{X}$ and R charts with the working and control limits and explain: 14M

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	1.85	1.81	1.75	1.76	1.83	1.76	1.71	1.8	1.77	1.79
Range	0.28	0.14	0.23	0.35	0.26	0.25	0.21	0.08	0.19	0.29

(OR)

10. (a) The following data provides the number of defective bolts which were found in an inspection of 10 samples of 100 bolts each. Construct the fraction defective chart by obtaining the UCL and LCL and state the nature of the process. 7M

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of defectives	5	12	5	6	3	4	8	3	5	6

   (b) Construct a suitable control chart for the following data and state your conclusions: 7M

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of defects	12	10	6	8	9	9	7	10	11	8

Q.P. Code: 1823301 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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)	Write about the contributions of Charles Darwin	7M
	(b)	Explain importance of biological classification of organisms? And write about three domain system	7M
		(OR)	
2.	(a)	Write about Three domain system	7M
	(b)	Write contributions of Louis Pasteur in science	7M

UNIT – II

3.	(a)	Write any five differences between prokaryotes and eukaryotes	7M
	(b)	Explain about Cell wall of prokaryotes	7M
		(OR)	
4.	(a)	Compare genetic material of prokaryotes with eukaryotes	7M
	(b)	Explain about Gogi complex and Endoplasmic reticulum	7M

UNIT – III

5.	(a)	Describe role of proteins in nutrition and classification	7M
	(b)	Explain about Starch and cellulose	7M
		(OR)	
6.	(a)	Write any 5 differences between DNA and RNA	7M
	(b)	Explain about Unsaturated fatty acids with examples	7M

UNIT – IV

7.	(a)	Explain about Law of dominance, Law of independent assortment	7M
	(b)	Explain about Law of segregation	7M
		(OR)	
8.	(a)	Explain about Degeneracy of genetic code	7M
	(b)	Explain about Codon, Start codon, Stop codons	7M

UNIT-V

9.	(a)	Explain about Isomerases	7M
	(b)	Explain about Hydrolases	7M
		(OR)	
10.	(a)	Explain about Factors effect the rate of photosynthesis	7M
	(b)	Exothermic and endothermic reactions with examples	7M

Q.P. Code: 1823401 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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)	Discuss prokaryotic and eukaryotic cells	7M
	(b)	Explain Animal cell	7M
		(OR)	
2.	(a)	Illustrate cell cycle chromosomes	7M
	(b)	Explain brief introduction to five kingdom of classification	7M

UNIT – II

3.	(a)	Illustrate the structure of Amino acid	7M
	(b)	Discuss in detail the rile of enzymes in industry	7M
		(OR)	
4.	(a)	State the structure of proteins	7M
	(b)	Discuss in detail Fermentation	7M

UNIT – III

5.	(a)	Explain any vertebrate digestive system	7M
	(b)	Illustrate different nutrients involving in Nutrition	7M
		(OR)	
6.	(a)	Explain the respiratory cycle	7M
	(b)	Demonstrate the steps involved in Excretory system	7M

UNIT – IV

7.	(a)	Describe the structure of Eukaryotic gene	7M
	(b)	Discuss in detail the gene replication	7M
		(OR)	
8.	(a)	Explain recombinant DNA technology in detail	7M
	(b)	Outline the cloning technology	7M

UNIT-V

9.	(a)	Explain the production of Vaccines	7M
	(b)	Illustrate the cloning in microbes in detail	7M
		(OR)	
10.	(a)	Describe in detail Bio engineering	7M
	(b)	Enumerate the basics of Biosensors	7M

Q.P. Code: 1824402 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
SUB: Effective Technical Communication (CE)

Time: 3 Hours **Max. Marks: 70**

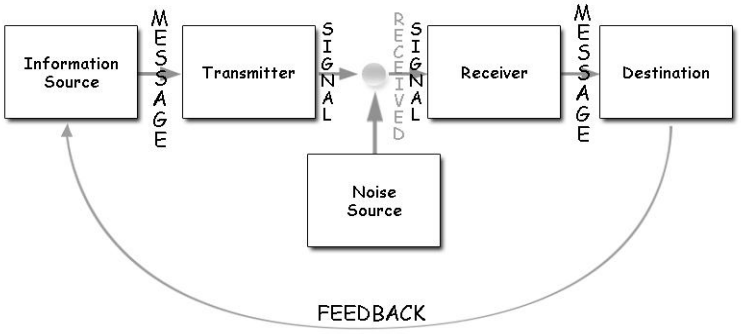
Answer any FIVE Questions choosing one question from each unit.
All questions carry Equal Marks.

UNIT - I

1. (a) Define Communication and elaborate the principles of effective communication. 7M
   (b) How can Language barriers be overcome? 7M

(OR)

2. (a) Explain the following process of communication devised by Shannon and Weaver. 7M



   (b) What are the types of Communication? 7M

UNIT – II

3. (a) What is the style of Technical Writing? 7M
   (b) In what way Collaborative Writing involves multiple authors? 7M

(OR)

4. (a) Revising, Drafting and Editing play vital role in Technical Writing process – Discuss. 7M
   (b) How to write indices for a project report? Provide one example. 7M

UNIT – III

5. (a) How one can achieve self-esteem? 7M
   (b) What is a Smart Goal setting strategy? 7M

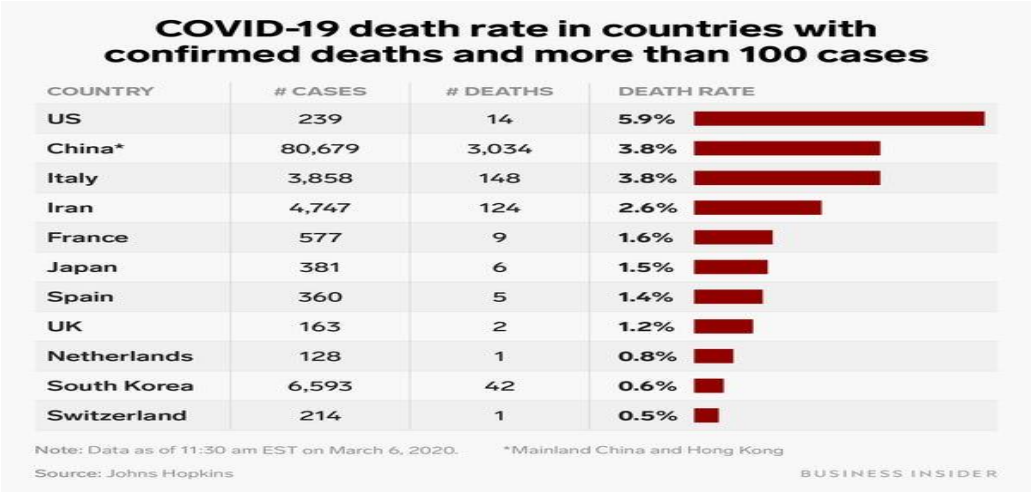
(OR)

6. (a) What are the best Time Management practices? 7M
   (b) Creativity is not a competition. – Discuss. 7M

UNIT – IV

7. (a) What are the Technical Presentation techniques? 7M

(b) Write a Report to Central Health Ministry on Corona Virus using the graph suggesting remedies to prevent Corona deaths. 7M



COVID-19 death rate in countries with confirmed deaths and more than 100 cases

COUNTRY	# CASES	# DEATHS	DEATH RATE
US	239	14	5.9%
China*	80,679	3,034	3.8%
Italy	3,858	148	3.8%
Iran	4,747	124	2.6%
France	577	9	1.6%
Japan	381	6	1.5%
Spain	360	5	1.4%
UK	163	2	1.2%
Netherlands	128	1	0.8%
South Korea	6,593	42	0.6%
Switzerland	214	1	0.5%

Note: Data as of 11:30 am EST on March 6, 2020. *Mainland China and Hong Kong

Source: Johns Hopkins BUSINESS INSIDER

(OR)

8. (a) You received a damaged product through Online Shopper – Amazon. Write an email requesting to cancel the order. Give reasons for the cancellation of the order 7M

(b) Elaborate the strategies of an effective Group Discussion. 7M

UNIT-V

9. (a) Write a note on Work culture. 7M

(b) What are etiquettes? Describe Job etiquettes. 7M

(OR)

10. (a) What are E mail etiquettes? 7M

(b) Define Professional Etiquettes. How should a professional behave in an organization? 7M

Q.P. Code: 1825401 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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. Explain nature and scope of Managerial economics 14M

(OR)

2. (a) Discuss statistical methods of demand forecasting. 7M
   (b) Describe constant elasticity of demand 7M

UNIT – II

3. (a) What are the stages of production function in the short run ? 7M
   (b) Describe the determinant of costs 7M

(OR)

4. Give the assumption and limitations of Break _even Analysis. 14M

UNIT – III

5. (a) Distinguish between monopoly and monophony 7M
   (b) State the characteristics of perfect competition 7M

(OR)

6. Explain the various pricing methods

UNIT – IV

7. (a) Evaluate sole trader form of organization 7M
   (b) What are the need for public enterprise 7M

(OR)

8. (a) Project x initially costs Rs 25000.it generates the following cash follows: 14M

years	1	2	3	4	5
Cash inflows(Rs)	9000	8000	7000	6000	5000
% value of Re.1at 10%	0.909	0.826	0.751	0.683	0.621

Taking the cut –off as 10% suggest whether, the project should be accepted or not.

UNIT-V

9. Briefly explain Accounting concepts and conventions 14M

(OR)

10. State the significance of accounting ratios in the analysis of financial statement 14M

Q.P. Code: 1801403 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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) Define Geology? Describe Various Branches of Geology and their importance in Civil Engineering point of view. 8M
   (b) A Brief note on Scope of Geology 6M

(OR)

2. Explain the weathering properties for different types of rocks? 14M

UNIT – II

3. Discuss the chemical composition, structure, mode of formation, physical properties of any four minerals 14M
   (i) Quartz (ii) Feldspar (iii) Mica (iv) Asbestos (v) Kyanite (vi) Calcite.

(OR)

4. Define the physical properties of minerals with suitable examples 14M

UNIT – III

5. (a) Explain briefly about Formation of Igneous Rocks? 7M
   (b) Describe the following Rocks Physical characteristics 7M
   (i) Basalt (ii) Conglomerate

(OR)

6. Write an essay with neat sketches Textures of Igneous Rocks 14M

UNIT – IV

7. Difference between dip & Strike? Explain with neat sketches Classification of Fold? 14M

(OR)

8. What is the difference between joint and fault? Explain with neat sketches Classification of Faults? 14M

UNIT-V

9. Write on formation, causes and prevention of landslides 14M

(OR)

10. (a) What are the Geological considerations of selection of Dams? 8M
    (b) Types of Dams with neat sketches 6M

Q.P. Code: 1801404 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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 vapor pressure and cavitation 4M
   (b) The velocity distribution in a fluid is given by u = 3000 y (1-2y), where u is the velocity in m/sec at a distance of y meters normal to the boundary. If the dynamic viscosity of fluid is 1.8 x 10^{-4} poise, determine the shear stress at y = 0.2 m. 10M

(OR)

2. (a) A vertical clean glass tube of uniform bore is to be used as a piezometer for measuring pressure of a liquid at a point. The liquid has a mass density of 15003 N/m^3 and a surface tension of 0.06 N/m in contact with air. For the liquid the angle of contact with glass is zero. If the capillary rise in the tube is not to exceed 2.0 mm, calculate the required minimum diameter of the tube. 7M
   (b) A body has a weight of 400 N at standard earth's gravity of 9.806 m/s^2. When a force of 800 N is applied to the body, what is the value of the acceleration (i) on earth and (ii) on moon where the gravity is 1.6 m/s^2. 7M

UNIT – II

3. (a) Deduce the expression for pressure measurement for U-tube differential manometer. 7M
   (b) Find the force on one side of a semicircular plate of radius 1.0 m, immersed in water vertically with its base downwards. The base is at a depth of 4.0 m below the water surface. 7M

(OR)

4. (a) State and prove Pascal's law 7M
   (b) A block of wood floats in water with 6 cm projecting above the surface of water. If the same block is made to float in glycerin of specific gravity 1.4, it projects 10 cm above the surface of glycerin. Find the specific gravity of glycerin. 7M

UNIT – III

5. (a) Explain about uniform and non-uniform flow. Give example. 4M
   (b) In a two-dimensional flow, if u = 2xy and $v = x^2 - y^2$, show that the flow satisfy the equation of continuity. 10M

(OR)

6. (a) Define stream function and velocity potential function. 4M
   (b) An unsteady velocity field is given by $u = t^2 + 3y$; $v = 4t + 5x$. Calculate the acceleration at the point (5, 3) at time t = 2 units. 10M

UNIT – IV

7. (a) A 25^0 reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 25 cm and 20 cm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet of the bend is 11 N/cm^2 and rate of flow of water is 0.80 m^3/s. 7M
   (b) A pitot tube is inserted in a pipe of 25 cm diameter. The static pressure in pipe is 10 cm of mercury (vaccum). The stagnation pressure at the centre of the pipe, recorded by the pitot tube is 0.981 N/cm^2. Calculate the rate of flow of water through pipe, if the mean velocity of flow is 0.75 times the central velocity. Take C_v = 0.97. 7M

(OR)

8. (a) Derive Bernoulli's equation from the Euler's equation. 7M
   (b) A reducer bend having an outlet diameter of 15 cm discharges freely. The bend, connected to a pipe of 20 cm diameter, has a deflection of 60^0 and lies in a horizontal plane. Determine the magnitude and direction of force on the anchor block supporting 7M

the pipe when a discharge of 0.3 m^3/s passes through the pipe.

UNIT-V

9.	(a)	What are similitude and its classification? Explain.	4M
	(b)	The resistance force F of a ship is a function of its length L, velocity V, acceleration due to gravity g and fluid properties like density ρ and viscosity μ. Write this relationship in a dimensionless form by using Buckingham method.	10M

(OR)

10.	(a)	Define Mach number and Weber Number.	4M
	(b)	The efficiency η of a fan depends upon the viscosity of the fluid, the angular velocity ω, diameter D of the rotor and the discharge Q. Express η in terms of dimensionless parameters using Buckingham π-theorem as $\eta = \phi[\omega D^2/\upsilon, Q/\omega D^3]$	10M

Q.P. Code: 1801405 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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 an expression for the elongation of a rectangular tapering bar subjected to an axial pull P. 7M

   (b) Two parallel walls 6 m apart are stayed together by a steel rod 25 mm diameter at a temperature of 80°C. Calculate the pull exerted by the steel rod when it is cooled to 20°C if, (i) the walls do not yield (ii) the walls yield together at two ends by 1.5 mm totally. Given: E = $2x10^5$ N/mm^2, coefficient of thermal expansion is $11x10^{-6}$/ ^{0}C 7M

(OR)

2. (a) What is strain energy? Derive an expression for strain energy due to axial force 6M

   (b) A stepped circular section bar ABCD (shown in figure Q2.(b) of steel (E = 210 GPa) has the part AB (solid, dia= 50mm, length = 60mm), part BC (hollow, dia = 30mm, length = 50mm) and part CD (solid, dia = 70mm, length = 50mm). What should be the inner diameter of part BC if the tensile stress in it is 200MPa? What is the total elongation of the bar ABCD? 8M

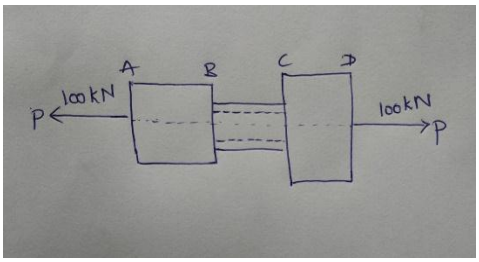


Figure: Q2 (b)

UNIT – II

3. (a) Explain the different types of supports in beams with neat sketches 6M

   (b) Draw the SFD and BMD for the beam shown in Fig. Q3 (b). AB=BC=CD= 2m 8M

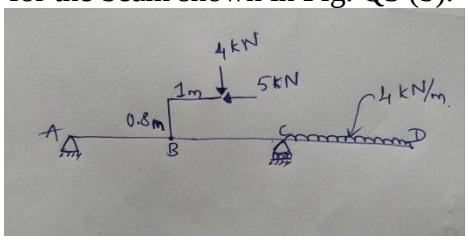


Figure: Q3 (b)

(OR)

4. (a) Derive the relationship between intensity of loading, shear force and bending moment. 6M

   (b) Draw shear force and bending moment diagrams for a beam loaded as shown in Fig. Q 4(b). Indicate the point of inflexion and locate the points of contra flexure and also maximum bending moment. 8M

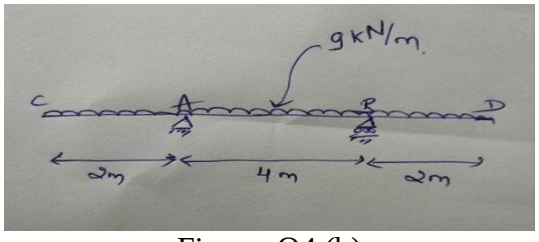


Figure: Q4 (b)

UNIT – III

5. (a) Derive the bending stress equation M/I = f/y = E/R with usual notations 7M

   (b) A beam is of square cross section of sides 100 mm. If the permissible stress is 70 N/mm^2, find the moment of resistance of the beam section. Find whether there is any improvement in moment of resistance if the section is placed with one of the diagonals vertical. 7M

(OR)

6. (a) Derive the relations for the principal stresses and principal strains. 7M

   (b) Show that the shear stress on the principal plane is zero. 7M

UNIT – IV

7. By area-moment method, find the deflection at the mid-span (P) of the prismatic and homogeneous beam shown in Fig Q 7. 14M

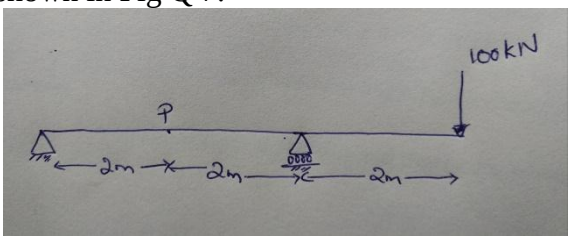


Figure: Q7

(OR)

8. A beam AB of span 4 m is simply supported at its ends. The beam carries a concentrated load of 20 kN at 1 m from the support A and a UDL of 10 kN/m in the right half span. Assume Flexural rigidity EI= 4000 kN-m^2. Using Macaulay's method, determine maximum deflection, deflection at mid span and slope at A. 14M

UNIT-V

9. (a) Derive the expression for torsion in circular shafts and state the assumptions 7M

   (b) A solid shaft rotating at 500 rpm transmits 30 kW. Maximum torque is 20% more than mean torque. Allowable shear stress is 65 MPa, modulus of rigidity is 81 GPa and angle of twist in the shaft should not exceed 1° in 1 mt length. Determine the suitable diameter. 7M

(OR)

10. (a) Briefly explain the behavior of Closed and open coiled helical springs under axial loads and axial twist 7M

    (b) An open coil helical spring made of 5 mm diameter wire has 16 coils,100 mm inner diameter with helix angle of 160. Calculate the deflection, maximum direct and shear stress induced due to an axial load of 300 N. E= 200 GPa, G= 90 GPa. 7M

Q.P. Code: 1801406 | **SET - 1**

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

B. Tech. IV Sem. (R18) Regular Examinations of November - 2020

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)	Distinguish between the concepts of hazard and disaster.	7M
	(b)	Explain hazard characteristics.	7M
		(OR)	
2.	(a)	Classify and describe types of hazards.	7M
	(b)	What are the characteristics of urban setting vulnerabilities ?	7M
		UNIT – II	
3.	(a)	Discuss the volcanic eruptions and Tsunami.	7M
	(b)	Explain any two hydrological disasters.	7M
		(OR)	
4.	(a)	Write short notes on transportation accidents, terrorist strikes.	7M
	(b)	Discuss the vulnerability profile of India.	7M
		UNIT – III	
5.	(a)	What are the environmental and social disaster impacts ?	7M
	(b)	Discuss the health, psycho-social issues on account of disaster impacts.	7M
		(OR)	
6.	(a)	What are the demographic aspects on account of disaster impacts ?	7M
	(b)	Discuss the global disaster trends.	7M
		UNIT – IV	
7.	(a)	Explain the Disaster management cycle and its phases.	7M
	(b)	What mitigation measures taken when disasters occurred ?	7M
		(OR)	
8.	(a)	What type of early warning systems before disasters occurred ?	7M
	(b)	Explain the reconstruction and development methods after disasters.	7M
		UNIT-V	
9.	(a)	Community roles and responsibilities on account of development. Explain.	7M
	(b)	Explain the Roles and responsibilities of government when disasters occurred.	7M
		(OR)	
10.	(a)	Discuss the DRR programmes in India.	7M
	(b)	Legislation for disaster risk reduction. Explain.	7M

Q.P. Code: 1802205 | **SET - 1**

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

B. Tech. IV Sem. (R18) Regular Examinations of November - 2020

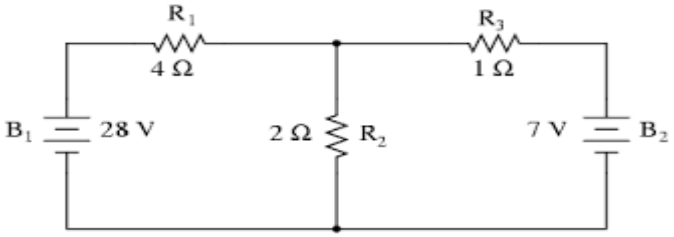
SUB: Basic Electrical Engineering (CE- Re Admitted)

Time: 3 Hours **Max. Marks: 70**

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

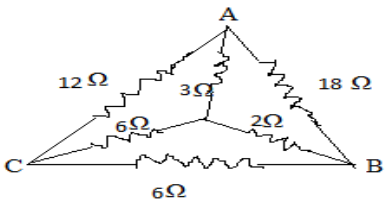
UNIT - I

1. (a) State and explain Kirchhoff's laws. 7M
   (b) Determine the loop currents in a given circuit shown in fig. 7M



(OR)

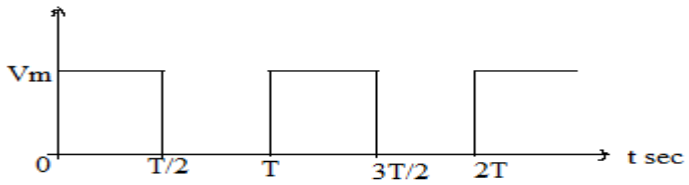
2. (a) For the network shown in fig. Calculate the equivalent resistance between nodes A and B. 7M



   (b) Explain nodal analysis of a simple system. 7M

UNIT – II

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



(OR)

4. (a) A circuit consists of resistance of 100 ohms in parallel with a pure capacitance of 50 μF is connected to a 230 V, 50 Hz supply. Calculate branch currents and supply currents. 7M
   (b) Distinguish between i)instantaneous power ii)real power iii) reactive power and iv) apparent power 7M

UNIT – III

5. (a) A 4 pole lap wound machine has 200 conductors and runs at 1500 rpm. The flux per pole is 0.015wb. Find induced EMF? 7M
   (b) Explain the construction of DC Generator. 7M

(OR)

6. (a) Derive the Torque equation in DC Motor. 7M
   (b) Describe the principle of operation of a DC motor with the help of neat sketch. 7M

UNIT – IV

7.	(a)	Define regulation and efficiency in single phase transformer.	7M
	(b)	Explain the basic principle and operation of 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 working principle of three phase Induction motor.	7M

UNIT-V

9.		Explain about the Miniature Circuit Breaker (MCB) with neat sketch	14M

(OR)

10.		Explain about power converters with neat diagram.	14M

Q.P. Code: 1802403 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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 following torques 1. Deflecting torque 2.Control torque 3. Damping torque	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
		(OR)	
2.	(a)	With neat diagram, explain the construction and operation of PMMC instrument.	7M
	(b)	A moving coil instrument whose resistance is 25Ω gives a full scale deflection with a Current of 1mA. The instrument is to be used with a manganin shunt to extend its range to 100mA. Calculate the error caused by a 100C rise in temperature	7M
		UNIT – II	
3.	(a)	Explain construction and working of dynamometer wattmeter.	7M
	(b)	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
		(OR)	
4.	(a)	Explain the construction and operation of single phase induction type energy meter.	7M
	(b)	A 230 V single-phase watt-hour 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
		UNIT – III	
5.	(a)	Explain how resistance is measured using Wheat stone's bridge? Explain in detail.	5M
	(b)	Describe in brief about the loss of charge method of measurement of high resistance	9M
		(OR)	
6.	(a)	Draw the Kelvin's double bridge circuit and explain the measurement of low resistance using this bridge	7M
	(b)	Derive an expression for an unknown capacitance using Schering bridge	7M
		UNIT – IV	
7.	(a)	Draw the diagram and explain the operation of DC Crompton's potentiometer.	7M
	(b)	Describe the construction and working of a polar type ac potentiometer.	7M
		(OR)	
8.	(a)	Discuss the major sources of errors in C.T	7M
	(b)	Derive the expression for phase angle and ratio errors	7M
		UNIT-V	
9.	(a)	Explain briefly Integrating type DVM	7M
	(b)	Explain briefly Successive approximation type DVM	7M
		(OR)	
10.	(a)	Draw the block diagram of a CRO and explain the different components.	7M
	(b)	What are Lissajous patterns? From the Lissajous patterns, how can the frequency and the phase difference be measured?	7M

Q.P. Code: 1802404 | **SET - 1**

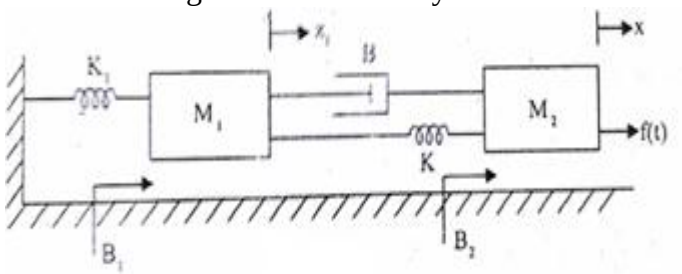
K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
SUB: Control Systems (EEE & ECE)

Time: 3 Hours **Max. Marks: 70**

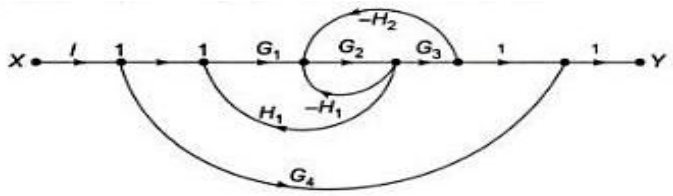
Answer any FIVE Questions choosing one question from each unit.
All questions carry Equal Marks.

UNIT - I

1. (a) Obtain the transfer function of the given mechanical system. 7M



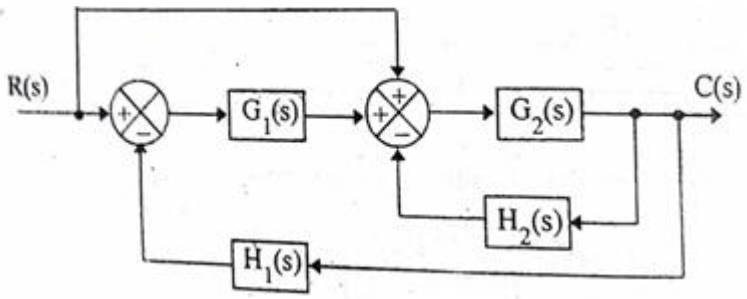
(b) Determine the closed loop transfer function for the given signal flow graph. 7M



Fig

(OR)

2. (a) Explain various types of control systems with examples briefly. 7M
(b) Using the block diagram reduction technique determine the closed loop transfer function. 7M



UNIT – II

3. (a) Derive the expression of unit step response of under damped second order system. 7M

(b) A unity feedback control system has an open loop transfer function $G(s) = \frac{k}{s(s+10)}$. 7M
Determine the gain 'K' so that the system will have a damping ratio of 0.9. For this value of 'K', determine the settling time, peak over shoot and time to peak over shoot for a unit step input.

(OR)

4. (a) A unity feedback system is characterized by the open loop transfer function 7M
$G(s) = \frac{10}{s(1+0.3s)(1+0.4s)}$. Determine the steady state error for unity step, unity ramp and unity acceleration inputs.
(b) Prove that PI controller will improves the steady state behavior of the system. 7M

UNIT – III

5. (a) Comment on the stability of the system represented by the characteristic equation $s^6+5s^5+10s^4+24s^3+20s^2+15s+10=0$. 7M

   (b) Determine the range of K for stability of a unity feedback system whose open loop transfer function is $G(s) = \frac{K}{S(S+1)(S+2)}$ by root locus. 7M

(OR)

6. (a) What are the necessary and sufficient conditions for a system to be stable according to the Routh-Hurwitz Criterion. 7M

   (b) A unity feed back control system has an open loop transfer function is 7M

   $$G(S) = \frac{K}{S(S^2+4S+13)}$$

   Sketch the root locus plot of the system.

UNIT – IV

7. (a) Illustrate about the frequency domain specifications. 7M

   (b) Draw the Bode-plot for transfer function $G(s)=\frac{10}{S(1+0.4S)(1+0.1S)}$. Obtain the phase cross-over frequency and gain cross over frequency. 7M

(OR)

8. (a) Describe the stability analysis from bode plot. 7M

   (b) Sketch the Nyquist plot for the following transfer function 7M

   $$G(s)H(s) = \frac{100}{(s+2)(s+4)(s+8)}$$

UNIT-V

9. (a) Draw the circuit diagram of a Lag compensator and obtain its transfer function. 7M

   (b) Design a suitable lag compensator to meet the following specifications. 7M
   Phase Margin=43^0, Bandwidth=1.02 rad/sec, Velocity error constant Kv ≥ 5 sec^{-1}

(OR)

10. (a) Explain the design procedure for lag-lead compensation. 7M

    (b) State the characteristics of lead compensator and write the procedure for designing the lead compensator. 7M

Q.P. Code: 1802405 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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) Discuss in detail about the principle of operation of a 3-phase induction motor. 7M
   (b) Why the rotor of three-phase induction motor can never attain synchronous speed? Explain in detail about torque-slip and torque-speed characteristics. 7M

(OR)

2. (a) A 3-Phase, 50Hz induction motor has a full-load speed of 1440 rpm. For this motor, calculate the following: (i) number of poles (ii) full load slip and rotor frequency (iii) speed of stator field with respect to stator structure and rotor structure (iv) speed of rotor field with respect to stator structure and rotor structure 10M
   (b) Discuss about various losses that are present in a 3-phase induction motor 4M

UNIT – II

3. (a) What are the various starting methods used for a 3-phase induction motor? Explain. 7M
   (b) Explain about the double-revolving field theory for single phase induction motors. 7M

(OR)

4. Discuss about different types of 1-phase induction motors along with their characteristics and applications 14M

UNIT – III

5. (a) Explain the construction details of synchronous generator and how it is differ with DC generator. 7M
   (b) Why AC generator is called synchronous generator? Differentiate between types of synchronous generators. 7M

(OR)

6. (a) Define pitch factor and derive the expression for it. 7M
   (b) The OC & SC Tests conducted on a 3 phase, star connected 866V, 100 KVA alternator has the following values. 7M

I_f (A)	1	2	3	4	5	6	7
V_{oc}(v)	173	310	485	605	728	790	840

A field current of 1Amp produces a short circuit current of 25 Amps. The armature resistance per phase is 0.15Ω. Calculate its full load regulation at 0.8 lagging p.f condition using EMF method.

UNIT – IV

7. (a) Define X_d and X_q. Derive the expression for X_d and X_q through slip test. 7M
   (b) Define and give expression for Synchronizing power and Torque. 7M

(OR)

8. (a) Discuss and state the conditions necessary for paralleling alternators. 7M
   (b) What are the various methods of synchronizing alternators? 7M

UNIT-V

9. (a) Discuss any two methods of starting of synchronous motors. 7M
   (b) Derive the condition for the maximum power developed by a synchronous motor. 7M

(OR)

10. (a) What is a Synchronous condenser? Explain. 7M
    (b) What is hunting in synchronous motors? Discuss its suppression methods. 7M

Q.P. Code: 1802406 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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) Draw the phasor diagram of medium transmission lines represented by a π model and derive the expression for voltage regulation. 7M

   (b) Calculate the following for a single circuit transmission line delivering a load of 50 MVA at 110 kV and 0.8 pf lagging. 7M
   i)Sending-end voltage ii) Sending-end current iii) Sending-end power
   iv) Efficiency of transmission.
   Given A=D=0.98 $\angle 3^\circ$; B = 110 $\angle 75^\circ \Omega$; C = 0.0005$\angle 80^\circ$ ℧

(OR)

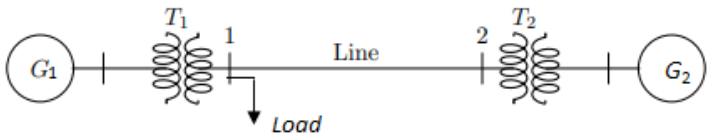
2. (a) Derive the expression for A, B, C, D constants for nominal-T method for medium transmission lines. 7M

   (b) Briefly explain following terms: (i) Surge impedance loading. (ii) Ferranti effect. (iii) Charging current. 7M

UNIT – II

3. (a) Draw the single line diagram of simple power system 2M

   (b) Draw the PU impedance diagram for the system shown in figure. Choose base values as 100 MVA, 20 kV. 12M

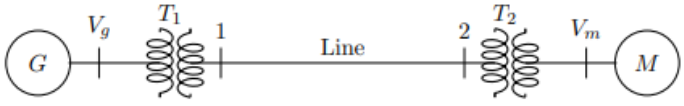


G_1: 90 MVA, 20kV, 9%
G_2: 90 MVA, 18kV, 9%
T_1: 20/200 kV, 80 MVA, 16 %
T2: 200/20 kV, 80 MVA, 20 %
Line: 120 Ω
Load: 200 kV, 48 MW + j 64MVAR

(OR)

4. (a) Explain the following 4M
   i) Per unit representation of a transformer ii) Per unit representation of a generator iii) Conversion of per units from old to new

   (b) For the power system shown in figure, draw the PU reactance diagram by selecting Generator ratings as base values. 10M



G: 40 MVA, 20kV, 30%
T_1: 33/220 kV, 35 MVA, 10 %
T2: 220/11 kV, 30 MVA, 10 %
M: 25 MVA, 10 kV, 20 %
Line: 30 Ω

UNIT – III

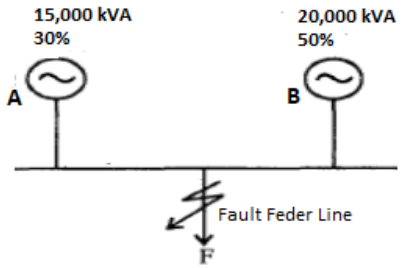
5. (a) Explain the reactance of synchronous machine in detail. 4M

   (b) A 3-φ transmission line operating at 10 kV and having a resistance of 1Ω and reactance of 4Ω is connected to the generating station bus bar through 5MVA step up transformer having a reactance of 5%. The bus bar is supplied by a 10 MVA alternator having 10 % reactance. Calculate short circuit kVA fed to symmetrical fault between phases, if it occurs (i) at the load end of transmission line (ii) at the high voltage terminal of the transformer. 10M

(OR)

6. (a) Describe the various steps involved in calculation of symmetrical short circuit currents in three phase system. 4M

   (b) The below figure shows the single line diagram of a 3- φ system. The reactance of each alternator is based on its own capacity. Calculate short circuit current. 10M



UNIT – IV

7. (a) Explain about sequence impedance of transmission line. 4M

   (b) Derive the expression for fault current and phase voltages in LG fault (with fault impedance). 10M

(OR)

8. (a) Derive the expression for fault current in LL fault (without fault impedance). 6M

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

UNIT-V

9. (a) Derive static load flow equations. 9M

   (b) Compare the advantages and disadvantages of GS and N-R method. 5M

(OR)

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

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

Q.P. Code: 1803401 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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) Explain with a neat sketches the working of spark ignition engine 7M
   (b) Explain the working of magneto ignition system with a neat sketch 7M

(OR)

2. (a) Compare four stroke and two stroke cycle engines 7M
   (b) The following readings were taken during a test of a single cylinder four stroke oil engine. Cylinder diameter 250mm, stroke length 400mm, gross mean effective pressure 7bar, pumping mean effective pressure 0.5bar, engine speed 250rpm, net load on the brake 1080N, effective diameter of the brake 1.5m, fuel used per hour 10kg, calorific value of fuel 44300 KJ/Kg, determine i) Indicated power ii) brake power iii) mechanical efficiency iv) indicated thermal efficiency 7M

UNIT – II

3. (a) Prove that the work done per kg of air in a compressor with clearance volume is given by 7M

$$w = \frac{n}{n-1} \times P_1(V_1 - V_4)\left[\left(\frac{P_2}{P_1}\right)^{\frac{n-1}{n}} - 1\right]$$

   (b) Explain with a neat sketch the construction and working of centrifugal compressor 7M

(OR)

4. (a) Distinguish between reciprocating air compressor and rotary air compressor 7M
   (b) Find the percentage saving in work by compressing air into two stages from 1bar to 7bar instead of in one stage. Assume compression index 1.35 i8n the both cases and optimum pressure and complete inter cooling in two stage compressor 7M

UNIT – III

5. (a) Explain with a neat sketch the construction and working of babcock and wilcox boiler 7M
   (b) Give the comparison between fire tube boiler and water tube boiler 7M

(OR)

6. (a) Explain with a neat sketches the following boiler mountings i) Water level indicator ii) Pressure gauge 7M
   (b) The following readings were obtained during a boiler trial of 6 hours duration. Mean steam pressure 12bar, mass of steam generated 40000Kg, mean dryness fraction 0.85, mean feed water temperature 30^o C, coal used 4000Kg, Calorific value of coal 33400KJ/Kg, Calculate i) Factor of equivalent evaporation ii) Equivalent evaporation from and at 100^o C iii) Efficiency of the boiler 7M

UNIT – IV

7. (a) Derive the condition for maximum discharge through the steam nozzle is given by 7M

$$\frac{P_2}{P_1} = \left(\frac{2}{n+1}\right)^{\frac{n}{n-1}}$$

   (b) Define the term steam nozzle; explain various types of nozzles 7M

(OR)

8.	(a)	Explain with a neat schematic diagram of counter flow jet condensers	7M
	(b)	A surface condenser is designed to handle 10000Kg of steam per hour. The steam enters at 0.08bar abs and 0.9 dryness and the condensate leaves at the corresponding saturation temperature. The pressure is constant throughout the condenser. Estimate the cooling water flow rate per hour if the cooling water temperature rise is limited to 10^{o} C.	7M

UNIT-V

9.	(a)	Distinguish between impulse turbine and reaction turbine	7M
	(b)	A single row impulse turbine develops 132.4KW at a blade speed of 175m/s. using 2Kg of steam per sec. Steam leaves the nozzle at 400m/s. Velocity coefficient of the blades is 0.9. Steam leaves the turbine blades axially. Determine the nozzle angle, blade angles at entry and exit, assuming no shock	7M

(OR)

10.		In a reaction turbine the blade tips are inclined at 35^{o} and 20^{o} in the direction of motion. The guide blades are of the same shape as the moving blades, but reversed in direction. At a certain place in the turbine, the drum diameter is 1m and the blades are 10cm height. At this place the steam has a pressure of 1.75bar and dryness 0.935. If the speed of this turbine is 250rpm, and the steam passes through the blades without shock, find the mass of steam flow and power developed in the ring of moving blades.	14M

Q.P. Code: 1803402 | **SET - 1**

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

B. Tech. IV Sem. (R18) Regular Examinations of November - 2020

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)	Calculate specific wight, density and specific gravity of 1lt of liquid which weighs 7N.	7M
	(b)	Explain the working of pizo meter with neat sketch	7M
		(OR)	
2.	(a)	The velocity distribution for flow over a flat plat is given by $u = \frac{3}{4}y - y^2$ in which u is the velocity in meter per second at a distance y meter above the plate. Determine the shear stress at y=0.15m. Take dynamics viscosity of fluid as 8.6 poise	7M
	(b)	Explain the working of U-tube mano meter with neat sketch	7M
		UNIT – II	
3.	(a)	Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC and the velocity in CE.	7M
	(b)	Derive an expression for Euler's equation on flow along a stream line.	7M
		(OR)	
4.	(a)	Explain the following i) Path line ii) Streak line iii) Stream line iv) Potential line	8M
	(b)	What are different types of fluid flow? Explain them.	6M
		UNIT – III	
5.	(a)	Derive the expression Darcy Weisbach equation?	8M
	(b)	Give an expression for rate of flow through orifice meter.	6M
		(OR)	
6.	(a)	Obtain the expression for discharge through venturi meter.	6M
	(b)	An orifice meter which orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50 cm of Hg. Find the rate of flow of oil of sp.gr. 0.9 and the co-efficient of discharge of the orifice meter is 0.64.	8M
		UNIT – IV	
7.	(a)	Find the Energy 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)	Explain the following: Laminar Boundary layer ii) Turbulent boundary Layer	6M
		(OR)	
8.		For the velocity profile for laminar boundary layer $\frac{u}{U} = \frac{3}{2}\left(\frac{y}{\delta}\right) - \frac{1}{2}\left(\frac{y}{\delta}\right)^3$ determine the boundary layer thickness, shear stress, drag force and co-efficient of drag in terms of Reynold's number.	14M
		UNIT-V	
9.	(a)	Derive Kutta- Joukowski equation.	14M
		(OR)	
10.	(a)	A sub marine which may be supposed to approximate a cylinder 4 m in diameter and 20 m long travels sub-merged at 1.3 m/s in a sea water. Find the drag exerted on it, if	10M

		the drag coefficient for Reynold number greater than 10^5 may be taken as 0.75. The density of sea water is given as 1035 kg/m^3 and kinematic viscosity s 0.015 stokes.	
	(b)	What is drag force and lift forces	4M

Q.P. Code: 1803403 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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 various type of kinematic links. 4M
   (b) Explain different kind of kinematic pairs giving example for each one of them. 10M

(OR)

2. (a) Sketch and explain the working operation of Crank and slotted lever quick return motion mechanism. 10M
   (b) Sketch and Explain Elliptical trammel mechanism. 4M

UNIT – II

3. (a) What are the straight line mechanisms? Give examples. 4M
   (b) Sketch and explain Peaucellier straight line motion mechanism. Prove that it produces an exact straight line motion. 10M

(OR)

4. (a) What is the condition for correct steering? 4M
   (b) Sketch and explain Davis steering gear mechanism and discuss relative advantages. 10M

UNIT – III

5. In a slider crank mechanism, the length of crank OB and connecting rod AB are 125 m and 500 mm respectively. The center of gravity G of the connecting rod is 275 mm from the slider A. The crank speed is 600 r.p.m. clockwise. When the crank has turned 45^0 from the inner dead center position, determine: 1.velocity of the slider A, 2.velocity of the point G, and 3. Angular velocity of the connecting rod AB. 14M

(OR)

6. In the mechanism shown in figure1, the crank OA makes 200rpm in the counter clockwise direction. Various links lengths are, OA=60mm, BC=300mm and OB= 200mm. Find, 1.Velocity and angular velocity of link BA and 2.Velocity of the slider. 14M

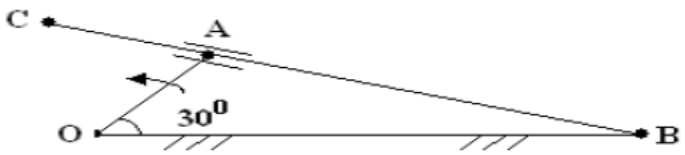


FIGURE: 1

UNIT – IV

7. (a) Explain with sketches, different types of followers. 4M
   (b) Draw and explain the displacement, velocity, and acceleration diagrams for a follower when it moves with simple harmonic motion. 10M

(OR)

8. A cam operating a knife edged follower has the following data: 14M

(i) Follower moves outwards through 40 mm during 60^0 of cam rotation.

(ii) Follower dwells for the next 45^0.

(iii) Follower returns to its original position during next 90^0.

(iv) Follower dwells for the rest of the rotation.

The displacement of the follower is to take place with simple harmonic motion during both the outward and return strokes. The least radius of the cam is 50 mm. Draw the profile of the cam when the axis of the follower passes through the cam axis. Determine velocity and acceleration of the follower during outward and return stroke if the cam rotates 300 r.p.m.

UNIT – V

9. (a) State and prove the law of gearing. 4M

(b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with pressure angle 20 degrees, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio. 10M

(OR)

10. In an epi-cyclic gear train, an arm carries two gears A and B having 35 and 45 teeth respectively. If the arms rotate at 150 r.p.m. in the anti-clock wise direction about the center of the gear A which is fixed, determine the speed of the gear B. If the gear A instead of being fixed makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? 14M

Q.P. Code: 1803405 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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.	(a)	Draw the generalized scheme of typical measurement system and explain its components.	7M
	(b)	What are the desired, modifying and inputs for a measurement system? Give examples of each.	7M
		(OR)	
2.		State and explain dynamic characteristics of an instrument.	14M

UNIT – II

3.	(a)	Explain the working of piezoelectric transducer with neat diagram.	7M
	(b)	Explain the working principle of bimetallic strip type thermometer.	7M
		(OR)	
4.	(a)	Sketch a Bourdon tube pressure gauge and explain its principle of operation.	7M
	(b)	Explain the construction and working of disappearing filament type optical pyrometer.	7M

UNIT – III

5.	(a)	Discuss the various direct methods of liquid level measurement	7M
	(b)	Explain the working of ultrasonic flow meter.	7M
		(OR)	
6.	(a)	Explain about electrical tachometer	7M
	(b)	Explain the working of elementary accelerometer.	7M

UNIT – IV

7.	(a)	List the characteristics required for the backing material of a bonded strain gauge.	7M
	(b)	Explain bonded and unbonded resistance wire strain gauge.	7M
		(OR)	
8.	(a)	Explain the methods of measuring the bending strain using the resistance strain gauge with neat sketch.	7M
	(b)	What is temperature compensation in strain gauge? Explain how it achieved?	7M

UNIT-V

9.	(a)	How does a mechanical load cell work? Explain the principle of measuring shaft torque using strain gauge torsion meter.	7M
	(b)	Explain the working of absorption dynamometer.	7M
		(OR)	
10.	(a)	Explain Electrical hygrometer with neat sketch.	7M
	(b)	List out the rules governing the construction of block diagram.	7M

Q.P. Code: 1804402 | **SET - 2**

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) A single card is drawn from a 52 card pack. i) What is the probability that the card is a jack? ii) What is the probability that the card will be a 5 or smaller? iii) What is the probability that the card is red 10? **7M**

   (b) State and prove Baye's theorem. **7M**

(OR)

2. (a) Explain any four properties of probability density function. **7M**

   (b) The distribution function for a random variable X is $F_X(x) = \begin{cases} 1 - e^{-2x} & x \geq 0 \\ 0 & x < 0 \end{cases}$. **7M**

   Find i) The density function (ii) the probability that $X > 2$ and (iii) the probability that $-3 < x \leq 4$

UNIT – II

3. (a) A random variable X has density function $f_X(x) = \begin{cases} \frac{\pi \ Cos(\pi x/18)}{16} & -4 < x < 4 \\ 0 & elsewhere \end{cases}$. Find its i) mean value $\overline{X}$ ii) second moment $\overline{X^2}$ and iii) variance. **7M**

   (b) The characteristic function for a gaussian random variable X, having a mean value of 0, is $\Phi_X(\omega) = \exp\left(\frac{-\sigma_X{}^2\omega^2}{2}\right)$. Find all the moments of X using $\Phi_X(\omega)$. **7M**

(OR)

4. (a) State and prove any three important properties of moment generating function of a random variable X. **7M**

   (b) A random variable X is uniformly distributed on the interval $(-\pi/2,\pi/2)$.X is transformed to the new random variable Y=T(X) = a Tan(X),where a>0. Find the probability density function of Y. **7M**

UNIT – III

5. (a) If $f_{XY}(x,y) = \begin{cases} b\ e^{-(x+y)} & 0 < x < a \ \ and \ \ 0 < y < \infty \\ 0 & elsewhere \end{cases}$ is a valid joint density function Find i) 'a' in terms of 'b' and ii) an expression for the joint distribution function. **7M**

   (b) Show that the density function of the sum of two statistically independent random variables is the convolution of their individual density functions, **7M**

(OR)

6. (a) State and prove Central Limit theorem. **7M**

   (b) Two random variables X and Y are defined by E[X]=0,E[Y]= -1,E[X^2]=2,E[Y^2]=4, and R_{XY}=-2. Two random variables W and U are W=2X+Y,U= -X-3Y. Find i) $\overline{W}$ and $\overline{U}$ ii) $\overline{W^2}$ and $\overline{U^2}$ iii) R_{WU} and iv) $\sigma_X{}^2$ and $\sigma_Y{}^2$ **7M**

UNIT – IV

7.	(a)	Explain the following. i) Stationary process. ii) Ergodicity.	**7M**
	(b)	State and prove any of the four properties of Auto correlation function.	**7M**
		(OR)	
8.	(a)	Find the Power spectral density of the $R_{xx}(\tau) = \frac{A^2}{2} Cos(\omega\tau)$.	**7M**
	(b)	The cross correlation of jointly wide sense stationary processes X(t) and Y(t) is assumed to be $R_{XY}(\tau) = B\ u(\tau)\ \exp(-W\tau)$, where B > 0 and W > 0 are constants. Find i) $R_{YX}(\tau)$ and ii) $S_{XY}(\omega)$.	**7M**

UNIT-V

9.	(a)	A stationary random process X(t) is applied to the input of a system for which $h(t) = 3\ u(t\ )t^2e^{-8t}$. If $E[X(t)] = 2$, what is the mean value of system's response $Y(t)$.	**7M**
	(b)	Explain the LTI system with random inputs.	**7M**
		(OR)	
10.	(a)	A random voltage modeled by white noise process *X* (*t)* with power spectral density $N_o/2$ is input to an RC integrator network. Find the output auto correlation function $R_{YY}(\tau)$ and average output power P_{avg} .	**7M**
	(b)	Explain the concept of band limited process and list out its properties.	**7M**

Q.P. Code: 1804403 | **SET - 1**

K.S.R.M. COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
B. Tech. IV Sem. (R18) Regular Examinations of November - 2020
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) In hybrid 'pi' model of a transistor at high frequencies, show that the gm is proportional to the collector current. 6M
   (b) Analyze the high frequency response of an Emitter follower. 8M

(OR)

2. (a) Analyze the high frequency model of Common Source FET amplifier. 5M
   (b) Derive the expressions for voltage gain, input admittance and output admittance for CS-FET at high frequencies. 9M

UNIT – II

3. (a) How the frequency response of an amplifier is effected due to biasing network and coupling capacitors? 7M
   (b) Draw and illustrate the response of high pass RC network for step input. 7M

(OR)

4. (a) With suitable circuit diagram, discus the operation of multistage transformer coupled amplifier and derive expressions for its voltage gain and current gain at mid-frequency stage. 10M
   (b) Elaborate the operating principle of Darlington amplifier. 4M

UNIT – III

5. (a) Define feedback. Demonstrate the concept of feedback in amplifiers with the help of block diagram. 7M
   (b) An amplifier has voltage gain with feedback of 200. If the gain without feedback changes by 40% and the gain with feedback should not vary more than 4%, determine the valves of open-loop gain A and feedback ratio β. 7M

(OR)

6. (a) Derive the general form of an LC oscillator. 7M
   (b) Determine the frequency of oscillations when a RC phase shift oscillator has R =10 kΩ, C = 0.01 μF and Rc = 2.2 kΩ. Also, find the minimum current gain needed for this purpose. 7M

UNIT – IV

7. (a) Summarize the working principle of complementary symmetry Class-B amplifier. Also list down the advantages and disadvantages 7M
   (b) With the help of a suitable circuit diagram explain the operation of Class- C power amplifier and derive an expression for efficiency. 7M

(OR)

8. (a) Define the Q-factor of a resonant circuit and derive the equations for Q-factor of RL and RC circuits. 7M
   (b) Outline the comparison of tuned amplifiers. 7M

UNIT-V

9. (a) Define positive logic. Draw and explain the operation of AND and OR gates using diode positive logic. 7M
   (b) Compare RTL, DTL and HTL logic families. 7M

(OR)

10. (a) Write a brief note on MOS and CMOS logic families. 7M
    (b) Implement a positive NOR DCTL gate. 7M