4E4135

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4E4135

B. Tech. IV Sem. (Main/Back) Exam., June/July-2014

Petroleum Engg.

4PE1 Advanced Engineering Mathematics-II/Mathematics-IV

Common with AI, BM, EI, CRE, EC, PE

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

1. NIL 2. NIL

UNIT – I

Q.1 (a) In an examination, the number of candidates who obtained marks between certain limits were as follows: [8]

Marks	No. of Candidates
0-19	41
20-39	62
40-59	65
60-79	50
80-99	17

Estimate the number of candidates securing marks below 70.

(b) Find the value of f (6), given that: [8]

x :	3	7	9	10
y :	168	120	72	63

OR

Q.1 (a) Estimate the value of f(7.5), given that: [8]

x :	1	2	3	4	5	6	7	8
y :	1	8	27	64	125	216	343	512

(b) Use stirling's formula to find u_{11}, given: [8]

$u_0 = 3010$, $u_5 = 2710$, $u_{10} = 2285$

$u_{15} = 1860$, $u_{20} = 1560$, $u_{25} = 1510$

$u_{30} = 1835$.

UNIT – II

Q.2 (a) Show that $\int_0^1 \frac{dx}{1+x} = \log_e 2 = 0.69315$ by using Simpson's "$\frac{1}{3}$" rule. [8]

(b) Solve the equation $\frac{dy}{dx}$ = x+y; with initial condition y(0) = 1 by Runge Kutta fourth order method, for x = 0 to x = 0.2 with h = 0.1 (8)

OR

(a) Find the first derivative of $f(x)$ at $x = 0.4$ from the following table: [8]

x :	0.1	0.2	0.3	0.4
$f(x)$:	1.10517	1.22140	1.34986	1.49182

(b) Using Milne's method to find y(2), if y(x) is the solution of $\frac{dy}{dx} = \frac{1}{2}(x+y)$ assuming y(0) = 2, y(0.5) = 2.636, y(1.0) = 3.595, and y(1.5) = 4.968. [8]

UNIT – III

Q.3 (a) State and prove orthogonal property of Legendre function. [8]

(b) For Bessel function, prove that [8]

$$\frac{d}{dx}\left[x^n J_n(x)\right] = x^n J_{n-1}(x) \; ; \; n \geq 0$$

OR

Q.3 (a) State and prove orthogonal property of Bessel's function. [8]

(b) For Legendre function, prove that $nP_n(x) = (2n-1)\,P_{n-1}(x) - (n-1)\,P_{n-2}(x)$ [8]

UNIT – IV

Q.4 (a) A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six. [8]

(b) For a bivariate distribution, $n = 18$, $\Sigma x = 12$, $\Sigma y = 18$, $\Sigma xy = 48$, $\Sigma x^2 = 60$, $\Sigma y^2 = 96$. Find the equations of lines of regression and correlation coefficient r. [8]

OR

Q.4 (a) In a book of 520 pages, 390 typographical errors occur. Assuming Poisson's law for the numbers of errors per page, find the probability that a random sample of 5 pages will contain no error. [8]

(b) Derive the expected value (mean) for Binomial distribution. [8]

UNIT – V

Q.5 (a) Obtain the shortest distance curve between two given points in a plane. [8]

(b) Solve Euler's equation for the functional: [8]

$$F = y(1 - y'^2)^{1/2}$$

OR

Q.5 (a) Derive Euler's equation. [8]

(b) Find the extremals of the functional

$$\int_A^B \frac{1}{y}(1 + y'^2)\,dx,$$

Where A is (-1, 1) and B is (1, 1). [8]

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B. Tech. IV Sem. (Main) Exam., June/July-2014
Electronics & Communication Engg.
4EC2A Random Variables & Stochastic Processes

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT-I

Q.1. (a) A bag Contains 4 bad and 6 good mobile phones. Two are drawn out from the bag at a time. One of them is tested and found to be good. What is the probability that the other phone is also good? [8]

(b) Prove the followings:-

(i) If A and B are mutually exclusive events, then [4]

$P(A/B) = P(B/A) = 0$

(ii) If $P(A) > P(B)$ then [4]

$P(A/B) > P(B/A)$

OR

Q.1. (a) What is meant by probability? How, it can be explained in various ways? [4]

(b) Determine P (A/B), if

(i) $A \cap B = \phi$ [4]

(ii) $A \subset B$ [4]

(iii) $B \subset A$ [4]

UNIT-II

Q.2. (a) What is a random Variable? Classify them. [6]

(b) Explain the Binomial distribution. Also, calculate the mean and variance of Binomial distribution. [10]

OR

Q.2. (a) A continuous random variable can assume any value between x = 2 and x = 5. It has a density function given by

$$f_x(x) = k(1+x)$$

Find $P(x < 4)$? [6]

(b) Explain the Rayleigh distribution. Also, calculate its mean and variance. [10]

UNIT-III

Q.3. (a) The joint pdf of a bivariate random variable is given by

$$f_{xy}(x,y) = \begin{cases} \frac{kx}{y} & ; \quad 1<x<2 \\ & \quad 1<y<2 \\ 0 & ; \text{ Otherwise} \end{cases}$$

Where K is a constant. Determine the value of K. Are X and Y independent? [10]

(b) State and explain central limit theorem. [6]

OR

Q.3. (a) The joint pmf of a bivariate random variable is given by

$$P_{xy}(x_i,y_i) = \begin{cases} k(2x_i + y_j) & ; \quad x_i = 1, 2 \\ & \quad y_j = 1, 2 \\ 0 & ; \text{ Otherwise} \end{cases}$$

Where, K is a constant. Determine the value of K and also the marginal pmf's of x and y. [8]

(b) If X and Y are two random variable, given by $X = \cos \psi$ and $Y = \sin \psi$ where, ψ is another random variable, uniformly distributed over $(0, 2\pi)$. Show that, X and Y are uncorrelated. [8]

UNIT-IV

Q.4. (a) Explain the strict and wide sense stationary random processes along with their necessary conditions. [8]

(b) Explain the auto correlation function. Also, prove that it is maximum at $\tau = 0$, i.e.

$$|R_{XX}(\tau)| \leq R_{XX}(0)$$ [8]

OR

Q.4. (a) Explain the random processes and classify them. [6]

(b) Explain the auto and cross covariance functions with necessary equations. [5×2= 10]

UNIT-V

Q.5. When a random process is transmitted through a linear system, calculate the mean and auto correlation function of output of LTI system. [16]

OR

Q.5. (a) Let X (t) be the WSS process with the auto correlation function given by

$$R_{XX}(\tau) = \left(\frac{Ao^2}{2}\right) \text{Cos}(Wo\tau)$$

Where, Ao and Wo are constants. Determine the power spectral density (psd) of $X(\tau)$. [8]

(b) Explain the power spectral density. Also, state and prove the various properties of psd. [8]

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B. Tech. IV Sem. (Main) Exam., June/July-2014
Electronics & Communication Engg.
4EC3A Electronic Measurement & Instrumentation

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. _____ 2. _____

UNIT-I

Q.1. (a) Explain the phenomenon of hysteresis in measurement systems. Also explain the terms, 'threshold', 'maximum input hysteresis' 'maximum output hysteresis', 'Dead zone' and backlash with neat diagrams. [3+5=8]

(b) Current was measured during a test as 30.4A, flowing in a resister of 0.105Ω. It was found later that the ammeter reading was low by 1.2 percent and the marked resistance was high by 0.3 percent. Find the true power as a percentage of the power that was originally calculated. [8]

OR

Q.1. (a) Define the following for Gaussian distribution data

(i) Precision index

(ii) Probable error

(iii) Standard deviation of mean

(iv) Standard deviation of standard deviation [4×2=8]

(b) Two resistors R_1 and R_2 are connected in series and then in parallel. The value of resistances are:

$R_1 = 100.0 \pm 0.1\ \Omega$

$R_2 = 50 \pm 0.03\ \Omega$

Calculate the uncertainty in the combined resistance for both series and parallel arrangements. [8]

UNIT-II

Q.2. (a) Describe the circuit diagram and operation of a true rms reading voltmeter using thermocouples. Explain how these voltmeters are free from waveform errors. [6+2=8]

(b) Explain the operation and functional block diagram of vector impedance meter. Describe how phase angle measurements are carried out with it. [6+2=8]

OR

Q.2. (a) Describe the methods of measurement of voltage and power at radio frequencies. [8]

(b) Write short note on following:

(i) Q-meter

(ii) Shielding and grounding [4+4=8]

UNIT III

Q.3. (a) Derive an expression for vertical deflection and deflection sensitivity of an electron beam in a CRT. [8]

(b) Explain the following with reference to analog type storage oscilloscope: [4×2=8]

(i) Bistable persistence storage

(ii) Bistable storage

(iii) Fast storage

(iv) Secondary emission

OR

Q.3. (a) Describe the phenomenon of synchronization of vertical input signal to its sweep generator. Explain the need of it. [6+2=8]

(b) Describe the principle of working and circuit details of a sampling oscilloscope. Discuss about delayed sweep. [6+2=8]

UNIT- IV

Q.4. (a) Describe the Working of a sweep frequency generator. What are the sweeper errors? [6+2=8]

(b) Explain the term "total harmonic distortion". Describe the functioning of a total harmonic distortion meter. [2+6=8]

OR

Q.4. (a) What is a frequency synthesizer? Explain in working with circuit details. [3+5=8]

(b) Explain the principle and working of spectrum analyzer. Discuss its applications. [6+2=8]

UNIT- V

Q.5. (a) Describe the construction, theory and working of thermocouples. Explain the different types of compensations used in the measuring system. [6+4=10]

(b) In a piezoelectric transducer, a flat frequency response within 5% is required. Find the value of minimum frequency in terms of time constant for which it can be used. If the time constant of the transducer is 1.5ms, find the value of minimum frequency. Find the phase shift at this frequency. [6]

OR

Q.5. (a) Why are dummy gauges used? In what way do they affect the output of a strain gauge bridge? [3+5=8]

(b) Write short note on following:

(i) Ultrasonic flow meter.

(ii) Load cells and its applications. [4+4=8]

5+5

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B. Tech. IV Sem. (Main/Back) Exam., June/July-2014
Electronics & Communication Engg.
4EC4A Electromagnetic Field Theory

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT-I

Q.1. (a) A vector field is given by the expression $\vec{A} = \frac{1}{r}\,\vec{a}_r$

(i) in cylindrical co-ordinates and

(ii) in spherical co-ordinates. Determine $\vec{A}$ in each case in Cartesian form, at a point (1, 1, 1) [10]

(b) Determine the value of $\nabla.\vec{A}$ at point (1,-1,1)

if $\vec{A} = \vec{i}\,x^2 z - \vec{j}\,2y^2z^2 + \vec{k}\,xy^2z$ [6]

OR

Q.1. (a) A vector field is given by $\vec{A} = yz\,\vec{a}_x + x_z\,\vec{a}_y + x_y\,\vec{a}_z$

Show that it is both irrotational (i.e. has zero curl) and solenoidal (i.e. has zero divergence) [8]

(b) Find the divergence of the vector function [8]

$\vec{A} = x^2\,\vec{a}_x + (xy)^2\,\vec{a}_y + 24\,x^2y^2z^2\,\vec{a}_z$

Evaluate the volume integral of $\nabla.\vec{A}$ through the volume of a units cube centered at the origin.

UNIT-II

Q.2. (a) Derive an equation for calculating the capacitance of a coaxial cable. [8]

(b) Derive Maxwell curl equation for static electric field. [8]

OR

Q.2. (a) Two small identical conducting spheres have charges of 2.0×10^{-9} coulomb and -0.5×10^{-9} coulomb respectively. When there are placed 4cm apart, what is the force between them? If they are brought into contact and then separated by 4cm; what is the force between them? [8]

(b) Derive an expression for electric field intensity $\vec{E}$ due to charge uniformly distributed over an infinite plane with surface charge density P_s. [8]

UNIT-III

Q.3. (a) State and explain Ampere's Law. A solid cylindrical conductor of radius R has a uniform current density. Derive expression for H both inside and outside of the

conductor. Plot the variation approximately of H as a function of radial distance from the centre of wire. [8]

(b) An iron ring of 10cm diameter and cross-section $4cm^2$ has a radial 8cm cut 1mm long. If the ring is wound with 56 turns of wire and the iron has a constant permeability (relative) of 200, determine the current required in the coil in creating a flux density of 1.0T in the air gap. Assume a leakage factor of 1.1 and neglect fringing. [8]

OR

Q.3. (a) Find the magnetic field and its curl at radius r within a copper conductor of radius $r_o > r$ Carrying current I uniformly distributed over the cross-section. [8]

(b) Explain the term magnetization. Find the magnitude of magnetization in a material in which

(i) There are 8.1×10^{28} atom / m^3 and the atoms have equal dipole moments of 1.7×10^{-33} Am^2

(ii) The relative permeability is 1.00038 and the magnetic field intensity is 0.31 A/m,

(iii) $B = 3 \times 10^{-5}$ wb/m^3 and the magnetic susceptibility is -4×10^{-6}. [8]

UNIT-IV

Q.4. (a) By integrating the poynting vector over the cross section of a coaxial cable, show that the total power carried by the cable is VI, where V is the voltage and I is the current. [8]

(b) Find the reflection coefficient and transmission coefficient of an electric field wave travelling in air and incident normally on a boundary between air and dielectric having permeability of μ_o and permittivity $\varepsilon_r = 4$. [8]

OR

Q.4. (a) A plane electromagnetic wave having a frequency of 10MHz has an average poynting vector 1w/m^2. If the medium is lossless with relative permeability 2 and relative permittivity 3. Find

(i) The velocity of propagation

(ii) The wave length

(iii) The impedance of the medium and

(iv) The r.m.s electric field E. [10]

(b) A plane wave travelling in air is normally incident on a block of paraffin with ε_r=2.2. Find the reflection coefficient and standing wave ratio. [6]

UNIT-V

Q.5. (a) Explain in detail about retarded potential and concept of radiation. [8]

(b) What do you understand by EMI testing? Explain in detail emission testing and susceptibility testing. [8]

OR

Q.5. (a) Explain different EMI standards. What are different types of coupling modes? [8]

(b) Explain with examples different methods of eliminating interference, shielding and grounding. [8]

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B. Tech. IV Sem. (Main) Exam., June/July-2014
Electronics & Communication Engg.
4EC5A Optimization Techniques

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT-I

Q.1. (a) Write 12 applications of optimization techniques in engineering. [10]

(b) A company produces two types of leather belts A and B. The respective profits are Rs 10 and Rs 5 per belts. The supply of raw material is sufficient for making 850 belts per day. For A, a special type of buckle is required and 500 are available per day. There are 700 buckles available for belt B per day. Belt A requires twice as much time as that required for belt B. The company can

produce 500 belts if all of them were of type A. Formulate a model for the above problem. [6]

OR

Q.1. (a) Briefly discuss six different basis for classification of optimization problems. [10]

(b) A paper mill produces two grades of paper namely A and B. It cannot produce more than 400 tons of grade A and 300 tons of B in a week. There are 160 production hours in a week. It requires 0.2 and 0.4 hours to produce a ton of product A and B respectively with corresponding profits of Rs 200 and Rs 500 per ton. Formulate the above as a LPP. [6]

UNIT-II

Q.2. (a) Solve the following LPP by simplex method:

Minimize $Z = x_1 - 3x_2 + 2x_3$

Subject to : $3x_1 - x_2 + 3x_3 \leq 7$, $-2x_2 + 4x_2 \leq 12$,

$-4x_1 + 3x_2 + 8x_3 \leq 10$, $x_1, x_2, x_3 \geq 0$ [8]

(b) Solve the following problem using duality:

Minimize $Z = 300x_1 + 110x_2$ subject to :

$30x_1 + 5x_2 \geq 6$, $20x_1 + 10x_2 \geq 8$, $x_1, x_2 \geq 0$, [8]

OR

Q.2. (a) Solve the following LPP by revised simplex method:

Maximize $Z = x_1 + 2x_2$

s.t. : $x_1 + x_2 \leq 3$, $x_1 + 2x_2 \leq 5$, $3x_1 + x_2 \leq 6$

$x_1, x_2 \geq 0$ [6]

(b) Solve the following LPP:

Maximize $Z = x_1 + 2x_2 + 3x_3 - x_4$

s.t. : $x_1 + 2x_2 + 3x_3 = 15$, $2x_1 + x_2 + 5x_3 = 20$

$x_1 + 2x_2 + x_3 + x_4 = 10$ and $x_1, x_2, x_3, x_4 \geq 0$ [10]

UNIT-III

Q.3. A Company is spending Rs. 1000 on transportation of its units to four warehouses from three factories. What can be the maximum saving by optimal scheduling? Solve the following transportation problem to find optimal solution. [16]

Factory ↓	← Warehouses →				Factory Capacity
	W_1	W_2	W_3	W_4	
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Warehouses Requirement	5	8	7	14	34

OR

Q.3. (a) Use VAM method to solve the following transportation problem: [8]

	D_1	D_2	D_3	D_4	Availability
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Requirement	20	40	30	10	100

(b) Four different jobs can be done on four different machines. The matrix below gives the cost in rupees of producing jobs (J_1, J_2, J_3, J_4) on machine (M_1, M_2, M_3, M_4). How should the jobs be assigned to the various machines so that the total cost is minimized. [8]

Machines

Jobs	M_1	M_2	M_3	M_4
J_1	12	30	21	15
J_2	18	33	9	31
J_3	44	25	24	21
J_4	23	30	28	14

UNIT-IV

Q.4. (a) Solve by univariate search method :

Minimum $f = 2x_1^2 - 2x_1x_2 + 5x_2^2 - 6x_1 + 6x_2 + 5$ [8]

(b) Minimize: $f(x_1, x_2) = x_1^2 + x_2^2 - 2x_1 - 3x_2 + 3$

Subject to: $g(x_1, x_2) = x_1 + 2x_2 - 4 \leq 0$

With the starting point $x_1 = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$, take $E_1 = 0.001$, $E_2 = 0.001$ and $E_3 = 0.01$ [8]

OR

Q.4. (a) Minimize $f(x) = \frac{1}{3}(x_1 + 1)^3 + x_2$, subject to:

$g_1(x_1, x_2) \equiv 1 - x_1 \leq 0$, $g_2(x_1, x_2) \equiv -x_2 \leq 0$ by the exterior penalty method and obtain the solution for $r = 1, 10$ and $r \to \infty$. [8]

(b) Minimize $f(x, y) = 8x^2 + y^2 + 4xy + 2x - y$ by Hook and Treves method, starting from the point (0,0) and taking $\Delta x = \Delta y = 0.8$. [8]

UNIT-V

Q.5. (a) Maximize: $Z = y_1 y_2 y_3$

subject to : $y_1 + y_2 + y_3 = 12$, $y_j \geq 0$, $j = 1, 2, 3$ [8]

(b) Use dynamic programming to solve the following LPP:

Max. $Z = x_1 + 9x_2$ s.t. $2x_1 + x_2 \leq 25$

$x_2 \leq 11$

$x_1, x_2 \geq 0$ [8]

[7400]

OR

Q.5. (a) Determine:

$$Z = \text{Max.}\ (x_1^2 + x_2^2 + x_3^2)$$

subject to : $x_1\, x_2\, x_3 \leq 4$

Where $x_j \geq 0$, $j = 1, 2, 3.$

[16]

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B. Tech. IV Sem. (Back) Exam., June/July-2014
Electronics & Comm.
4EC5 Random Variables & Stochastic Processes

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

1._____ 2._____

UNIT-I

Q.1. (a) What is meant by probability? Explain it. [4]

(b) Explain the conditional probability and prove the following:-

(i) If $B \subset A$ then $P(A/B) = 1$

(ii) If $A \subset B$ then $P(A/B) \geq P(A)$

(iii) If A and B are mutually exclusive events, then

$$P(A/B) = P(B/A) = 0$$

[4×3=12]

OR

Q.1. (a) If $P(A) = 3/4$, $P(B) = 5/8$, Then prove that -

$P(A \cap B) \geq 3/8$ [8]

(b) If $P(A) = 0.4$, $P(B) = 0.7$, and $P(A \cap B) = 0.3$

Find $P(\overline{A} \cap \overline{B})$. [8]

UNIT-II

Q.2. (a) Explain the normal distribution. Also, calculate its mean and variance. [10]

(b) A continuous random variable has a pdf $f_x(x) = 3x^2; 0 \leq x \leq 1$

Find a and b such that -

(i) $P(x \leq a) = P(x > a)$

(ii) $P(x > b) = 0.05$ [3×2=6]

OR

Q.2. (a) If $f_x(x) = \begin{cases} x\, e^{\frac{-x2}{2}} & ; x \geq 0 \\ 0 & ;\text{otherwise} \end{cases}$

Show that, $f_x(x)$ is the pdf of continuous random variable x. [6]

(b) Explain the Poisson distribution. Also, calculate its mean and variance. [10]

UNIT-III

Q.3. A function is given as follows:-

$$g(x,y)=\begin{cases} b\,e^{-x}\cos(y) & ;\ 0 \le x \le 2,\ 0 \le y \le \pi/2 \\ 0 & ;\ \text{otherwise} \end{cases}$$

Determine the value of b for which g (x, y) becomes a valid pdf function. Also determine the marginal pdf of X and Y. Are, X and Y independent? [16]

OR

Q.3. (a) If X and Y are independent standard normal random variables, find the pdf of $Z = X+Y$. [10]

(b) The joint pmf of a bivariate random variable is given bv -

$$p_{xy}(x_i, y_j)=\begin{cases} k(2x_i + y_j) & ;\ x_i = 1,2,\ y_j = 1,2 \\ 0 & ;\ \text{otherwise} \end{cases}$$

Determine the value of K. [6]

UNIT-IV

Q.4. (a) State & explain the central limit theorem. [6]

(b) Explain the characteristic function and write down its various properties. [10]

OR

Q.4. Consider the random variable Y, which is defined as

$$Y = AX + B$$

Determine -

(i) Covariance of X and Y.

(ii) Correlation coefficients of X and Y. [8×2=16]

UNIT-V

Q.5. (a) Explain the power spectral density and write down its various properties. [8]

(b) If X (t) is wide sense stationary random process and its auto correlation function is given by

$$R_{XX}(\tau) = 25 + \frac{4}{1+6\tau^2}$$

Determine variance of the process X (t). [8]

OR

Q.5. When a random process is transmitted through a LTI system, calculate the mean and autocorrelation function of output of the LTI system. [16]

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4E2091

B. Tech. IV Sem. (Back) Exam., June/July-2014

Electronics & Comm.

4EC6.2 Data Base Management System

Common for 4EC6.2 & 4AI6.3

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

1._____ 2._____

UNIT-I

Q.1 (a) Describe different database schemes in detail and also explain the difference between physical and logical data independence. [8]

(b) What is the role of entity – relationship data model in database design? Design an E – R diagram for banking enterprise. [8]

OR

Q.1 (a) Any weak entity set can be converted to strong entity set by simply adding appropriate attribute. Why then do we have weak entity sets? [8]

(b) Design a generalization specialization hierarchy for a motor vehicle sales company. The company sells motorcycles, cars, vans and buses. Justify the

placement of attribute at each level of hierarchy. Explain why they should not be placed at higher or lower – level? [8]

UNIT-II

Q.2 (a) Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. [8]

(b) Define Boyce – Codd normal form. How does it differ from 3NF? Why it is considered a stronger form of 3NF? [8]

OR

Q.2 (a) What is a functional dependency? What are the possible sources of information that defines the functional dependencies that hold among the attributes of a relational schema? Why can we not infer a functional dependency automatically from a particular relation state? [8]

(b) Find a 3NF decomposition of the following relation schema: {Faculty, Dean, Department, Chairperson, Professor, Rank, Student}. The relation satisfies the following function dependencies -

Faculty → Dean

Dean → Faculty

Department → Chairperson

Professor → Rank, Chairperson

Department → Faculty

Student → Department, Faculty, Dean,

Professor Rank → Department, Faculty [8]

UNIT-III

Q.3 (a) What are triggers? How are they created? What are their advantages and disadvantages? Explain with example. What is the difference between a trigger and procedure? [8]

(b) Consider the following tables:

Branch (branch No., street, city, pin code); Staff (Staff No. FName, LName, Position, Sex, DOB, Salary, Branch No,),

Answer the following using SQL Command –

(i) List all staff with a salary between Rs 30,000 and Rs 40,000 of branch office in New Delhi or Jaipur

(ii) Find the number of staff working in each branch and the sum of their salaries.

(iii) For each branch office with more than one member of staff, find the number of staff working in each branch and the sum of their salaries.

(iv) Find all staff whose salary is larger than the salary of least one member of staff at branch B003.

(v) Give all staff a 13% pay increase. [8]

OR

Q.3 (a) What do you mean by a view in SQL? What are it's advantages? How the view types effect the DML operations on view? [8]

(b) Consider the following relations:

Sailors (Sid : integer, Sname : string, rating : integer, age : integer);

Boat (bid : integer, bname : string, colour : string);

Reserves (Sid : integer, bid : integer, day : date);

Write SQL statement to create the above relations and answer the following queries.

(i) Find the average age of sailors for each rating level that has at least two sailors?

(ii) Find the names of sailors who reserved all boats?

(iii) For each red boat find the number of reservation. [8]

UNIT-IV

Q.4 (a) Explain the difference between random and index files. [8]

(b) Why the hash structure is not the best choice for a search key on which range queries are likely. [8]

OR

Q.4 (a) Explain the multiset structure with a suitable example. [8]

(b) What do you mean by inverted structure? Explain it by suitable example. [8]

UNIT-V

Q.5 (a) What is log? How it is maintained? Discuss the salient features of deferred database modification and immediate database modification strategies in brief. [8]

(b) Which of the following schedule is conflict serializable? For each seriatizable schedule, determine the equivalent serial schedule.

(i) $r_1(x); r_3(x); w_1(x); r_2(x); w_3(x);$

(ii) $r_1(x); r_3(x); w_3(x); w_1(x); r_2(x);$

(iii) $r_3(x); r_2(x); w_3(x); r_1(x); w_1(x);$ [8]

OR

Q.5 (a) What do you mean by serializability? Discuss the conflict and view serializability with suitable example. Discuss the testing of serializability also. [8]

(b) Explain the transaction concept and it's states with suitable example [8]

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4E2149

Roll No. _____ Total No of Pages: 4

4E2149

B. Tech. IV Sem. (Back) Exam., June/July-2014

Electrical & Electronics Engineering

4EX2 Digital Electronics

Common with BM, EX, EC, EI

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT-I

Q.1 (a) Convert the following Numbers to decimal:

(i) $(50)_7$

(ii) $(198)_{12}$

(iii) $(1032.2)_4$

(iv) $(342)_6$ [2+2+2+2=8]

(b) Represent the decimal Number 8620

(i) in BCD

(ii) in Excess .3 code

(iii) 2,4,2,1 code

(iv) as a binary number. [2+2+2+2=8]

OR

Q.1 (a) Demonstrate by means of truth tables the validity of the following theorems of Boolean algebra.

(i) The associative laws.

(ii) De-Morgan's Theorems for three variable

(iii) The distributive Law of + over. [2+2+2=6]

(b) Reduce the following Boolean Expressions to the required number of literals:

(i) ABC + A'B'C + A'BC + ABC'+ A'B'C' to five literals

(ii) AB + BC +AC' + BCD to four literals [4]

(c) Implement the following function with NAND and NOR gates.

$F(x,y,z) = \sum(0, 6)$ [6]

UNIT-II

Q.2 (a) Draw the interconnection of I^2L gates to form a 2×4 decoder. [4]

(b) Using the NOR outputs of two ECL gates. Show that when connected together to an external Resistor and negative supply voltage the wired connection produces an OR function [8]

(c) Why ECL family in the fastest logic family? E‹plain [4]

OR

Q.2 (a) Show the circuit of a four – Input NAND gates using CMOS Transistors. [8]

(b) The MOS Transistor is bilateral current may flow from source to drain or from drain to Source. Using this property, derive a circuit that Implements the Boolean function $Y = (AB + CD + AED + CEB)'$ [8]

UNIT-III

Q.3 Given the following truth table.

X	Y	Z	F_1	F_2
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

(i) Express F_1 and F_2 in product of maxterm

(ii) Obtain the simplified functions in sum of products.

(iii) Obtain the simplified functions in product of sums. [16]

OR

Q.3 (a) Simplify the Boolean function F Using the don't - Care condition d, in sum of products form

(i) $F = A'B'C' + A'CD + A'BC$

$d = A'BC'D + ACD + AB'D'$

(ii) $F = y' + x'z'$

$d = yz + xy$

[4+4=8]

(b) Find the minimal expression using quine MCCluskey Method

$f(A,B,C,D) = \sum m\,(1,5,6,12,13,14) + d\,(2,4)$ [8]

UNIT-IV

Q.4 (a) Implement a full subtractor with two half subtractors and an OR gates. [8]

(b) Design a Combinational circuit to check for even parity of four bits. A Logic -1 output is required when the four bits do not constitute an even parity. [8]

OR

Q.4 (a) Implement a full adder circuit with a decoder and two OR gates. [8]

(b) Implement the following function using multiplexor: [8]

$F(A, B, C) = \sum (1, 3, 5, 6)$

UNIT-V

Q.5 (a) Draw the logic diagram of a master – slave D flip flop. Use NAND gates. [8]

(b) Design a Counter that counts the decimal digit according to the 2, 4, 2, 1 code. Using T Flip Flop. [8]

OR

Q.5 (a) With the help of simple circuit diagram. Explain the difference in working of asynchronous and synchronous Counter. [8]

(b) Design BCD counter with J-K flip flop. [8]

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4E4120

Roll No. _____ Total No of Pages: 3

4E4120

B. Tech. IV Sem. (Main/Back) Exam., June/July-2014
Electronics Instrumentation & Control Engg.
4EI1A Analog Electronics
Common with EE, EX, EC & EI

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT-I

Q.1. (a) Discuss with the help of a circuit example, the purpose of providing (i) negative feedback (ii) positive feedback in amplifiers. [8]

(b) A negative feedback of $\beta = 0.002$ is applied to our amplifier of gain 1000. Calmlate the change in overall gain of the feedback amplifier if the internal amplifier is subjected to a gain reduction of 15%. [8]

OR

Q.1. (a) Show that the negative feedback in amplifiers increases the bandwidth and improves signal to noise ratio. [8]

(b) Draw and explain the current shunt feedback. [8]

UNIT-II

Q.2. (a) State the Barkhausen conditions for an electronic system to oscillate with feedback. [8]

(b) Draw the circuit diagram of a colpitts oscillator and explain its working. [8]

OR

Q.2. (a) Draw the circuit diagram of an R-C phase shift oscillator and obtain an expression for its frequency of oscillation. [8]

(b) Differentiate between the monostable and bistable multivibrator. [8]

UNIT-III

Q.3. (a) Explain how would you arrive at the hybrid - π equivalent circuit model in CE configuration at high frequencies. Explain the different parameters involved in the circuit. [8]

(b) A CE – connected amplifier has $C_{cb} = 5pF$, $C_{be} = 12pF$, $h_{fe} = 100$, $h_{ie} = 1.5\ k\Omega$. Determine input capacitance to the circuit for a circuit collector resistance of 12Ω. [8]

OR

Q.3. (a) Draw the circuit of emitter follower at high frequencies and explain its working. [8]

(b) A transistor with alpha cut-off frequency = 5 MHz and h_{fe} or $\beta = 50$ is used in a CE configuration. When connected to an amplifier, it has stray capacitance of 80 pF at the output terminals. Determine the upper 3dB frequency when

(i) $R_L = 10k\Omega$ and (ii) $R_L = 100k\Omega$ [8]

UNIT-IV

Q.4. (a) What is parallel resonances? What are its features? How is it different from series resonances? [8]

(b) Explain the reasons for potential instability in tuned amplifiers. [8]

OR

Q.4. (a) Draw the circuit diagram of a collector tuned amplifier and derive expressions for the voltage gain at the tuned frequency and bandwidth. [8]

(b) Explain in brief the advantage of using double – tuned circuit over a single tuned circuit. Draw the circuit diagram of double tuned amplifier and its frequency response. [8]

UNIT-V

Q.5. (a) What is a power amplifier? In what respects does it differ from a voltage amplifier? Why heat sink are needed. [8]

(b) Explain collector efficiency, distortion and power dissipation. [8]

OR

Q.5. (a) Prove that for class B push-pull power amplifier the theoretical conversion efficiency is 78.5% and power dissipation capability of each transistor used shall be at least 0-2 times the maximum power output of the amplifier. [8]

(b) Draw the circuit of class D and class E amplifier and their application. [8]

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4E4121

Roll No. _____ Total No of Pages: 7

4E4121

B. Tech. IV Sem. (Main/Back) Exam., June/July-2014
Electronics Instrumentation & Control Engineering
4EI2A Control System-I

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. _____ 2. _____

UNIT – I

Q.1 (a) Explain closed loop system and compare with open-loop system. [8]

(b) Obtain the transfer function $X_0(S)/X_i(S)$ of the mechanical system shown in fig.1(a), also obtain the transfer function $E_0(S)/E_i(S)$ of the electrical system shown in fig.1(b). Show that these transfer functions of the two systems are of identical form and thus they are analogous system. [8]

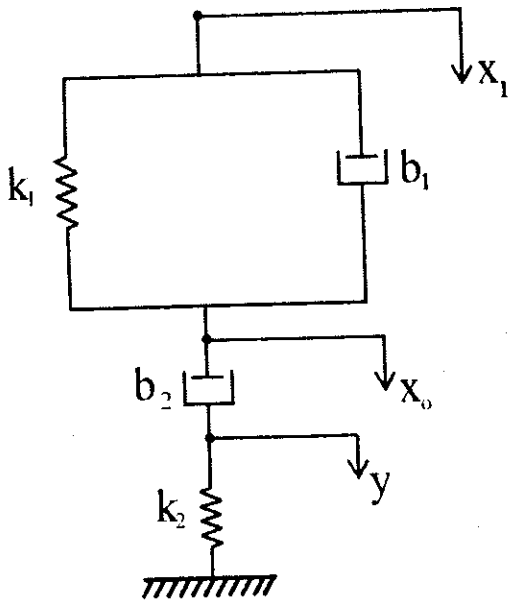

Fig. – 1(a)

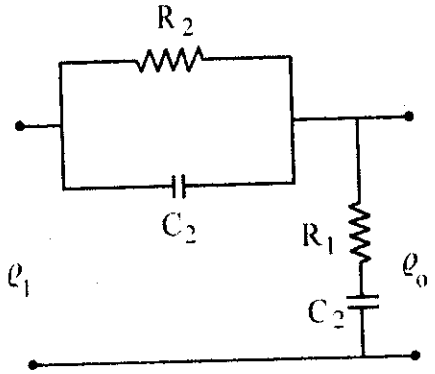

Fig. – 1(b)

OR

Q.1 (a) Explain sensitivity of control system to parameters variations. [8]

(b) Apply SFG gain formula directly to the block-diagram shown in fig.2, to find the transfer functions.

$$\left.\frac{Y(S)}{R(S)}\right|_{N=0} \quad , \quad \left.\frac{Y(S)}{N(S)}\right|_{R=0}$$

Express Y(S) in terms of R(S) & N(S) when both inputs are applied simultaneously. [8]

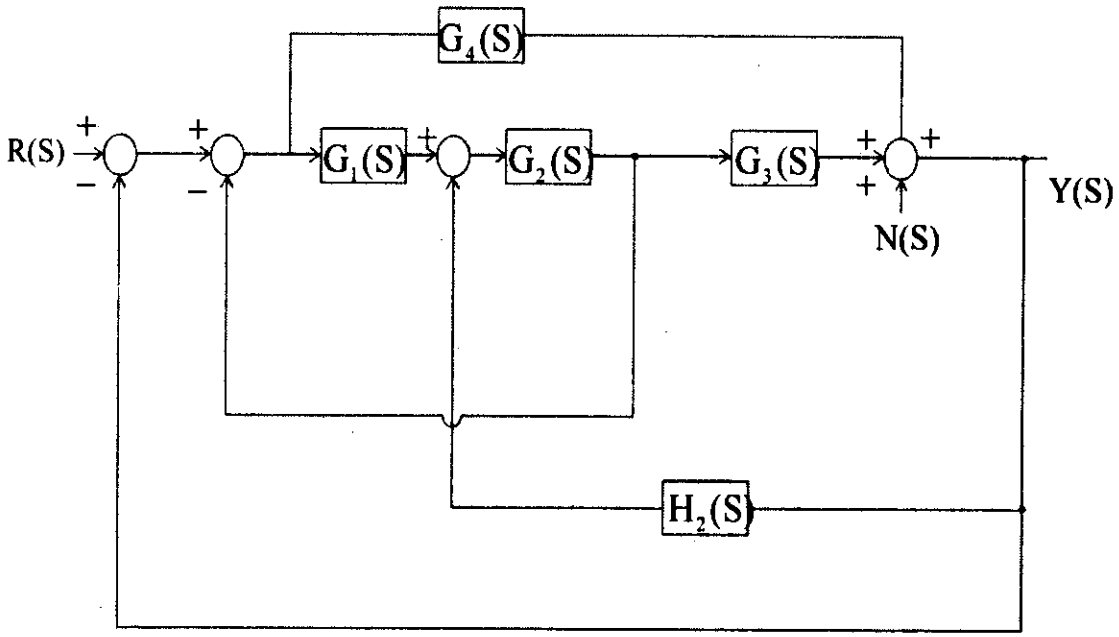

Fig.-(2)

UNIT – II

Q.2 (a) Describe the basic principle of operation of a d.c. potentiometer. Explain why a potentiometer dose not load the voltage source whose voltage is being determined. [8]

(b) (i) What do you mean by tachogenerator? Explain mathematical modeling of tachogenerator. [4]

(ii) Explain velocity control system with tachogenerator feedback. [4]

OR

Q.2 (a) Under what condition is the torque constant Ki of a dc motor valid, and how is it related to back-emf constant K_b? [8]

(b) What is step angle? Also explain variable reluctance stepper motors. [8]

UNIT – III

Q.3 (a) Explain absolute and relative stability. [8]

(b) Find the steady-state error of the system, when input is $X = \frac{5}{2S} - \frac{3}{S^2} + \frac{4}{S^3}$. [8]

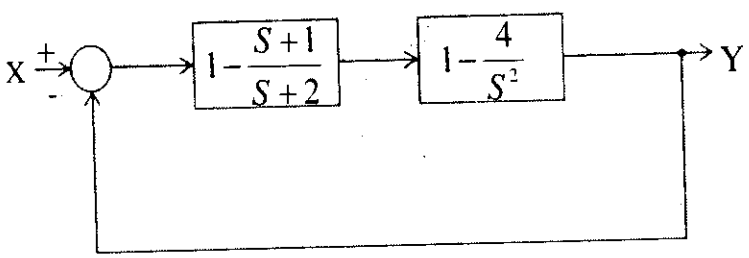

Fig. - (3)

OR

Q.3 (a) Obtain the response of the closed-loop system, defined by -

$$\frac{C(S)}{R(S)} = \frac{5}{S^2+S+5}$$

When the input r(t) is given by -

$$r(t) = 2 + t$$

[the input r(t) is a step input of magnitude 2 plus unit ramp input] [8]

(b) A feedback system has an open loop transfer function -

$$G(S)H(S) = \frac{Ke^{-S}}{S(S2+5S+9)}$$

Determine by use of Routh criterion the maximum value of K for the closed loop system to be stable. [8]

UNIT – IV

Q.4 (a) Explain Nyquist stability criterion. [8]

(b) The forward path T.F. of a unity feedback system is $G(S) = \frac{Ke^{-TS}}{S+1}$

(i) Construct the root loci for T= 1 Sec & K >0.

(ii) Find the values of K where the system is stable. [8]

OR

Q.4 (a) Prove that the polar plot of sinusoidal T.F. -

$$G(jw) = \frac{jwt}{1+jwt} \; ; \quad \text{for } 0 \leq w \leq \infty$$

is a semicircle. Find the center & radius of the circle. [8]

(b) Consider a unity-feedback system whose open-loop T.F. is

$$G(S) = \frac{Ke^{-0.8S}}{S+1}$$

using the Nyquist plot, determine the critical value of K for stability. [8]

UNIT – V

Q.5 (a) Explain frequency domain specifications and their correlation with time-domain. [8]

(b) The block- diagram of a furnace control system is shown in fig.-4. The T.F. of the process is

$$G_P(S) = \frac{1}{(1+10S)(1+25S)}$$

The time delay T_d is 2 sec.

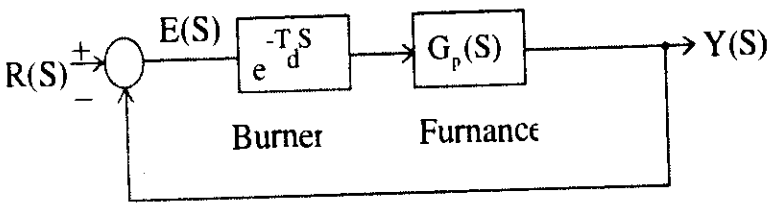

Fig.- (4)

Plot the bode diagram of G(S) = Y(S)/E(S) and the gain cross over & phase cross over frequency. Find the gain margin & phase margin. [8]

OR

Q.5 (a) The open loop plant of a plastic extrusion is given by [8]

$$G(S) = \frac{40}{(S+1)(0.25S+1)}.$$

Design a series of lead-compensator which is described by

$$G_c(S) = \frac{r(\tau s+1)}{(r\tau s+1)}$$

so that the phase margin is 45° & the Band Width (BW) must be maintained at a value approximation the same as that of the un-compensated system.

(b) Explain design of PID controller for a system. [8]

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4E4122

Roll No. _____

Total No of Pages: 4

4E4122

B. Tech. IV Sem. (Main) Exam., June/July-2014
Electronics Instrumentation & Control Engg.
4EI3A Electrical Measurement
Common with EE, EX & EI

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT-I

Q.1. (a) A permanent magnet moving coil instrument has a coil of dimensions 15mm × 12mm. The flux density in the air gap is 1.8×10^{-3} wb/m^2 and the spring Constant is 0.14×10^{-6} Nm/rad. Determine the number of turns required to produce an angular deflection of 90 degrees when a current of 5mA is flowing through the coil. [8]

(b) Explain the testing and calibration of single phase energy meter by phantom loading. [8]

OR

Q.1. (a) The law of deflection of a moving iron ammeter is given by $I = 4\theta^n$ ampere where θ is the deflection in radian and n is a constant. The self inductance when the meter current is Zero is 10 mH. The Spring constant is 0.16 N-m/rad.

(i) Determine an expression for self inductance of the meter as a function of θ and n.

(ii) With n = 0.75, Calculate the meter current and the deflection that corresponds to a self – inductance of 60 mH. [10]

(b) Explain the errors in wattmeter and energy meter and their compensation techniques. [6]

UNIT-II

Q.2. (a) A 1000/5 A, 50 HZ current transformer has a secondary burden comprising a non inductive impedance of 1.6Ω. The primary winding has one turn. Calculate the flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 1.5W at full load. The magnetizing mmF is 100A. [8]

(b) Explain the effect of secondary burden on the ratio and phase errors of a current transformer. [8]

OR

Q.2. (a) A potential transformer, ratio 1000/100 volt, has the following constants:

Primary resistance = 94.5 Ω

Secondary resistance = 0.86 Ω

Primary reactance = 66. 2 Ω

Total equivalent reactance = 110 Ω

No load current = 0.02 A at 0.4 Power factor. Calculate (i) phase angle error at no load (ii) burden in VA at unity power factor at which the phase angle will be zero. [10]

(b) Explain the Arnold's method for testing of current transformer. [6]

UNIT-III

Q.3. Explain the construction and working of co-ordinate type a.c. Potentiometer. How is it Standardized? Discuss about sources of error in these instruments. [16]

OR

Q.3. Explain with the help of suitable diagrams, how a.c. potentiometer can be used for: ---

(i) Calibration of voltmeters and ammeters.

(ii) Calibration of wattmeters and energy meters. [16]

UNIT-IV

Q.4. (a) What are the difficulties associated with the measurement of low resistance? Explain the potentiometer method for the measurement of low resistance. [8]

(b) Explain the loss of charge method for measurement of insulation resistance of cables, [8]

OR

Q.4. (a) Explain the working principle of price's Guard wire method for the measurement of High resistance. [8]

(b) Explain the importance of the value Earth's resistance. Discuss about the fall of potential method for measurement of Earth resistance. [8]

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UNIT-V

Q.5. (a) Explain the working of Anderson Bridge for self-inductance measurement with proper phasor diagram. [8]

(b) What are the sources of errors in bridge circuits? What are the precautions and methods used to minimize the errors? [8]

OR

Q.5. (a) Explain the working of Heaviside's bridge for mutual inductance measurement with proper phasor diagram. [8]

(b) Write short notes on Wagner Earth device with suitable diagram. [8]

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4E4123

Roll No. _____ Total No of Pages: 3

4E4123

B. Tech. IV Sem. (Main/Back) Exam., June/July-2014
Electronics Instrumentation & Control Engineering
4EI4A Sensors & Transducers

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

470

UNIT-I

Q.1 (a) What do you mean by static & dynamic characteristics of a transducer? Explain some of them. [8]

(b) What is meant by representation of a transducer system as First, Second & Higher order system. Explain with its significance. [8]

OR

Q.1 (a) Explain Gross, Systematic, Statistical and Random errors in measurement. [8]

(b) What is Calibration? How standards are classified? Mention various standards for Calibration. [8]

UNIT-II

Q.2 (a) Define following: [8]

(a) Seebeck effect

(b) Peltier effect

(c) Thompson effect

(d) Peltier coefficient

(b) Describe common thermo couple systems. Also describe cold junction compensation using a resistance bridge network. [8]

OR

Q.2 (a) Describe piezoelectric crystal wafer used as a force transducer. Mention various modes of utilizing piezoelectric effect. [16]

UNIT-III

Q.3 (a) What are Hot wire Resistance transducers? Discuss application of above transducer to measure liquid level. Write a note on Pirani gauge. Draw typical characteristics of a Pirani gauge. [16]

OR

Q.3 (a) What are bonded & unbonded strain gauges? Develop a relation dR/R/dl/l with Poisson's ratioμ.

Draw the circuit for strain gauge instrumentation and explain it. [16]

UNIT-IV

Q.4 (a) Discuss the following force measurement methods.

(i) Helical Spiral Springs

(ii) Cantilever Beams

(iii) Column type Load cell.

(iv) Diaphragm Elements. [16]

OR

Q.4 (a) Discuss Viscosity to Pressure Convertors by drawing a neat diagram. [8]

(b) Discuss Level to Pressure Converters by drawing a neat diagram. [8]

UNIT-V

Q.5 (a) Discuss working of gas discharged plasma panels. [8]

(b) Discuss working & construction of LCD displays. [8]

OR

Q.5 Write short notes on -

(i) Lighting of particular LEDs of a LED matrix display [8]

(ii) Flat panel CRT [8]

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4E4124

Roll No. _____

Total No of Pages: 4

4E4124

B. Tech. IV Sem. (Main/Back) Exam., June/July-2014
Electronics Instrumentation & Control Engineering
4EI5A Analog Communication
Common with BM & EI

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

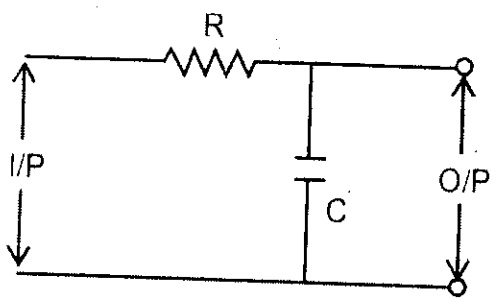
Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT-I

Q.1 (a) Determine the noise equivalent bandwidth of the RC low pass filter shown in figure. [8]



(b) How does shot noise originate? [3]

(c) A10kΩ and a 20kΩ resistor are both at a room temperature of 27°C. For a 100 kHz Bandwidth, determine the rms value of the thermal noise voltage across their series and parallel combinations. [5]

OR

Q.1 (a) Define Equivalent noise temperature and calculate the noise figure of amplifiers in cascade, also calculate the equivalent noise temperature. [12]

(b) A low noise amplifier of equivalent noise temperature 30°K and 20dB available power gain precedes a microwave receiver which has a noise figure of 25dB. What is the overall noise equivalent temperature if the room temperature is 27°C? [4]

UNIT-II

Q.2 (a) Draw a block diagram of weaver's method of generation of SSB–SC signals and explain it briefly. [8]

(b) Refer to the amplitude modulated wave if Ac_{max} = 75 and Ac_{min} =15, determine the following, by assuming sinusoidal modulating signal -

(i) modulating index m

(ii) carrier power and total sideband power

(iii) amplitude and phase of the additional carrier to be added in order to have m = 50% [8]

OR

Q.2 (a) Explain the method of generation of wide band angle modulated signals using indirect method and also generate narrowband signals. [8]

(b) What is pre emphasis and de emphasis? Draw the circuits used for them. [4]

(c) Compute the bandwidth requirement for the transmission of a FM signal having a frequency deviation of 75 kHz and an audio bandwidth of 10 kHz. [4]

UNIT-III

Q.3 (a) Sketch a neat block diagram of super heterodyne receiver and explain following-

(i) AGC and delayed AGC

(ii) Image frequency rejection and image frequency rejection ratio

(iii) Sensitivity and selectivity

(iv) Choice of Local oscillator frequency. [10]

(b) Draw and explain the working of a practical diode detector and define the process of negative peak clipping. [6]

OR

Q.3 (a) Explain the principle of Foster Seeley discriminator for FM detection with diagram. [8]

(b) Draw the block diagram of a super heterodyne FM broadcast receiver and explain the function of each block. [8]

UNIT-IV

Q.4 (a) Define and explain the meaning of the term Standing Wave Ratio. What is the formula for it if the load is purely resistive? Why is a high value of SWR often undesirable? [8]

(b) A transmission line has a characteristic impedance of 70Ω. The length of line is 200 m. Find the input impedance at a frequency of 1 MHz if the line is -

(i) short circuited

(ii) open circuited at far end. [8]

OR

Q.4 (a) A transmission line is 15 km long and has the following distributed constants all mile loop at frequency of 1 MHz, R = 90Ω, L = 0.001H, C = 0.062 μf and G = 1.5 micro mhos. If the line is terminated in its characteristics impedance and supplied with an input power at the sending of 6 mw, calculate - [8]

(i) Zo

(ii) the magnitude of the received current

(iii) The power received.

(b) Explain the method of attenuation and reflection coefficient of a transmission line. [8]

UNIT-V

Q.5 (a) An optic fiber is made of glass with a refractive index of 1.55 and is clad with another glass with a refractive index of 1.51. Launching takes place from air -

(i) What numerical aperture does the fiber have?

(ii) What is the acceptance angle? [8]

(b) Explain the principle of Radar and write the range equation. [8]

OR

Q.5 (a) Write the Kepler's laws with respect to satellite communication and explain Geostationary orbits. [8]

(b) Draw the block diagram of satellite communication. [4]

(c) Write the name of losses in optical fibers. [4]

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4E4125

Roll No. _____ Total No of Pages: [3]

4E4125

B. Tech. IV Sem. (Main) Exam., June/July-2014
Electronics Instrumentation & Control Engineering
4EI6A Electrical Technology

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

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UNIT-I

Q.1 (a) Explain phenomenon of generating voltage in d.c. generator, and also explain the types of D.C. generators. [8]

(b) Explain the parallel operation of D.C. generator. [8]

OR

Q.1 (a) Explain phenomenon of production of torque in D.C. generators. [8]

(b) Explain the construction and operation of D.C. servo motor. Also, state its applications. [8]

UNIT-II

Q.2 (a) Explain the construction, and operation of Induction Motor, with suitable diagrams. [8]

(b) Explain the cogging and crawling of Induction Motor. [8]

OR

Q.2 (a) Explain Single-Phase Induction Motor, with suitable diagrams. [8]

(b) Explain the construction and operation of stepper motor, and also state its applications. [8]

UNIT-III

Q.3 (a) Explain the basic principle of synchronous motor, and also explain the zero power factor characteristics of synchronous motor. [10]

(b) Explain need and application of open circuit and short circuit characteristics of synchronous machines. [6]

OR

Q.3 (a) Explain single phase synchronous motor with suitable diagram. [8]

(b) State how a synchronous motor can be started, stopped and reversed. [8]

UNIT-IV

Q.4 (a) Give a general idea of transmission and distribution of electrical power system with suitable diagram. [8]

(b) Explain in detail electrical equipment of a Sub-Station. [8]

OR

Q.4 (a) Explain phenomena of Interface of power lines with telecommunication in transmission and distribution system. [8]

(b) Write short notes on conductors and insulators of transmission lines. [8]

UNIT-V

Q.5 (a) Explain basic types of faults, its causes and consequences of faults in electrical power system. [8]

(b) Explain over current relay, with help of suitable diagram. [8]

OR

Q.5 (a) Explain elementary idea of static relay in protection of electrical power system, with their advantages and limitations. [8]

(b) Explain necessity of protection in power system and give a brief idea of role of relay in protection of power systems. [8]

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