3E1141

Roll No. _____ Total No of Pages: 3

3E1141

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019
BSC Electrical & Electronics Engineering
3EE2-01 Advance Mathematics
Common For EE, EX

Time: 3 Hours **Maximum Marks: 120**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Evaluate: $\Delta^6(ax-1)(bx^2-1)(cx^3-1)$

Q.2 Prove that : $E = 1 + \frac{\delta^2}{2} + \delta\sqrt{1+\frac{\delta^2}{4}}$

Q.3 Find Laplace transform of $(t+2)^2 e^t$.

Q.4 Find inverse Laplace transform of $\frac{s}{s^2+9} e^{-\left(\frac{2\pi}{3}\right)s}$

Q.5 Slate convolution theorem for Laplace Transform.

Q.6 Find the Fourier cosine transform of f (x) :

$$f(x) = \begin{cases} 1 & 0 < x < a \\ 0 & x > a \end{cases}$$

Q.7 Find Z – transform of $a^n \cos n\theta$.

Q.8 Define analytic function and write C – R equations.

Q.9 Show that $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 2x + 1$ satisfy the Laplace equation.

Q.10 Find the bilinear transformation which maps the points $Z_1 = 1$.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Use Gauss forward Interpolation formula to evaluate y_{30}. Given that -

$y_{21} = 18.4708$, $y_{25} = 17.8144$, $y_{29} = 17.1070$, $y_{33} = 16.3432$, $y_{37} = 15.5154$

Q.2 Evaluate $\int_{-1.6}^{-1} e^x \, dx$ by Simpson $\frac{1}{3}$ rule with 6 intervals.

Q.3 Find the real root of equation $x \log_{10} x - 1.2 = 0$ correct to three decimal places.

Q.4 Define Dirac delta function and obtain its Laplace transform.

Q.5 Find inverse Laplace transform of $\frac{1}{s^3(s^2+1)}$.

Q.6 Using Z – transform solve the following difference equation $6\, u_{n+2} - u_{n+1} - u_n = 0$, where $u_0 = 0$, $u_1 = 1$ $n \geq 0$.

Q.7 Determine the real part of an analytic function if imaginary part of $V = \frac{x-y}{x^2+y^2}$.

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 Find the first, second and third derivatives of f (x) at x = 1.5 if -

x	1.5	2.0	2.5	3.0	3.5	4.0
y = f (x)	3.375	7.000	13.625	24.000	38.875	59.000

Q.2 Find approximate value of y for x = 0.2, if $\frac{dy}{dx} = x + y^2$ using Runge – Kutta method,

Given y = 1 at x = 0.

Q.3 Express the function :

$$f(x) = \begin{cases} \frac{2}{\pi}\sin x & 0 \le x \le \pi \\ 0 & x > \pi \end{cases}$$

as Fourier sine integral and hence evaluate

$$\int_0^\infty \frac{\sin \pi\lambda \sin x\lambda}{(1-\lambda^2)}\, d\lambda$$

Q.4 Show that $\omega = \frac{z-a}{z+a}$, a > 0 transform the plane x > 0 to unit circle |ω| <|. Also find the transform of |ω| = constant in the z – plane.

Q.5 Prove that $L\left[\frac{\sin^2 t}{t}\right] = \frac{1}{4}\log\left(\frac{s^2+4}{s^2}\right)$

Hence deduce $\int_0^\infty \frac{\sin^2 t}{t}\, dt = \frac{\pi}{2}$

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3E1143

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019

PCC Electrical Engineering

3EE4-05 Electrical Circuit Analysis

Common For EE, EX

Time: 3 Hours **Maximum Marks: 120**

Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and staied 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

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Explain Maxwell's loop Current method.

Q.2 Define the Concept of duality and dual networks.

Q.3 Explain the suitable example of DOT Convention in Coupled Circuit.

Q.4 Find the transient response of series R-C Circuit having d.c. excitation.

Q.5 Explain initial and final conditions in network element.

Q.6 Describe form factor and peak factor.

Q.7 Write the condition of Symmetry and Reciprocal network for ABCD.

Q.8 Write down the definition of the Laplace Transform.

Q.9 Write down the necessary Condition of Stability of a network function.

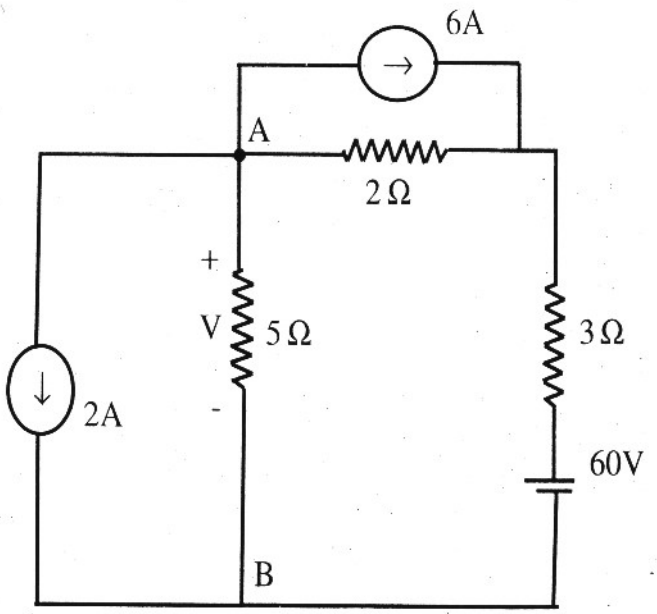
Q.10 Explain Power Triangle with diagram.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

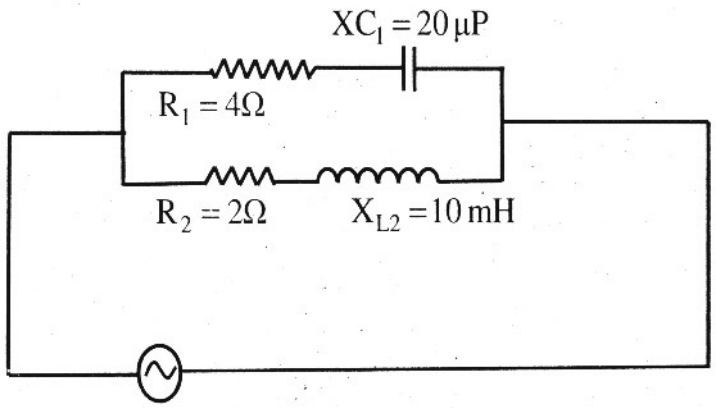
Attempt any five questions

Q.1 Apply superposition theorem to the given circuit for finding the voltage drop V across the 5 Ω resistor: [8]



Q.2 A Series RLC Circuit has R = 10 Ω, L = 1H, C = 20 μF. A 100 V, 50 Hz Supply is applied across the circuit. Find the input current and voltage across the elements. [8]

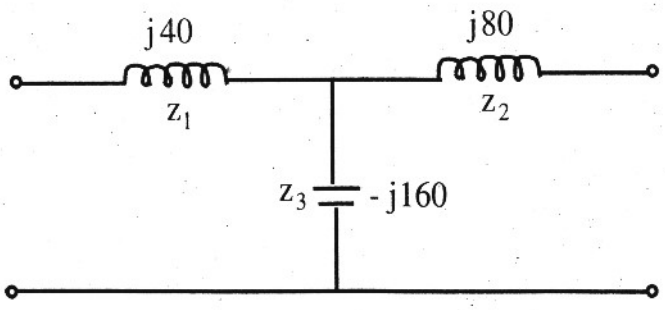
Q.3 Find the resonant frequency for the parallel Circuit shown in fig. [8]



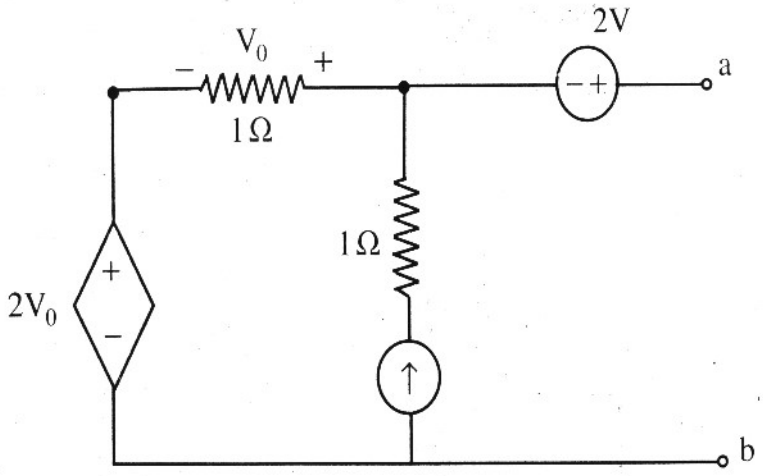
Q.4 The Current through a Circuit element is $\frac{4S^2}{S+7}$. Find the current in t domain at

$S \rightarrow 0$ and $S \rightarrow \infty$. [8]

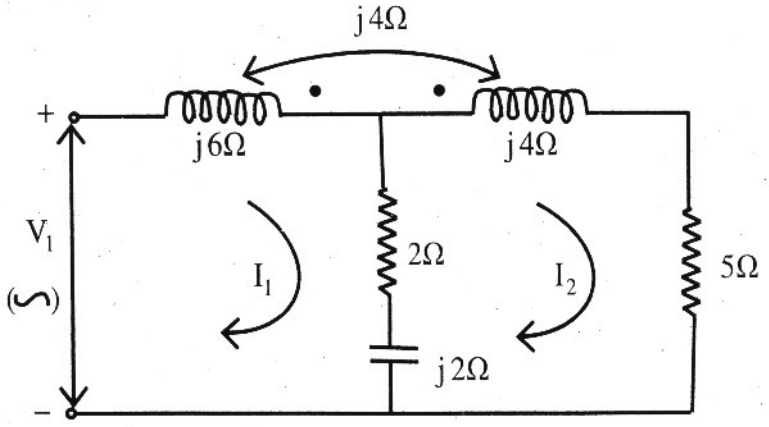
Q.5 Find Y – Parameters of network shown in fig. from z-Parameters. [8]



Q.6 Find Norton's equivalent circuit at the left of terminals a – b for the Circuit given in fig. [8]



Q.7 Find the Conductively Coupled equivalent Circuit of given fig: [8]

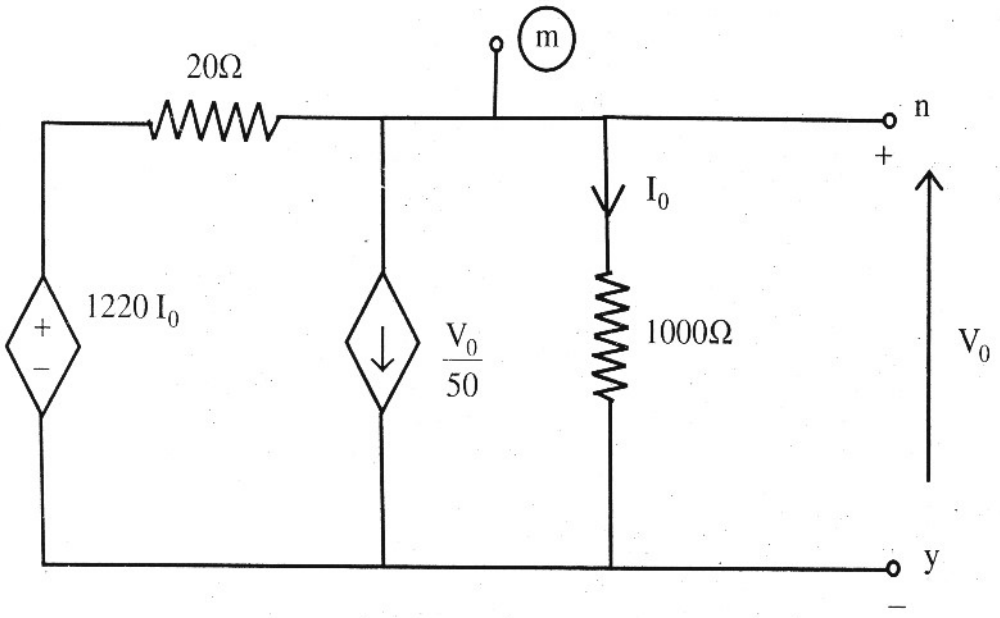


PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

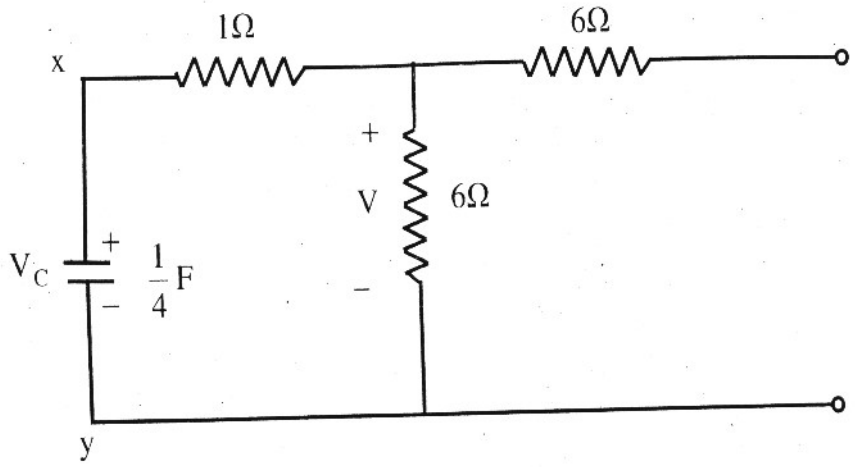
Attempt any four questions

Q.1 State and explain Thevenin's theorem. Find thevenin equivalent circuit for network shown in fig. at the left of terminals x – y. [15]

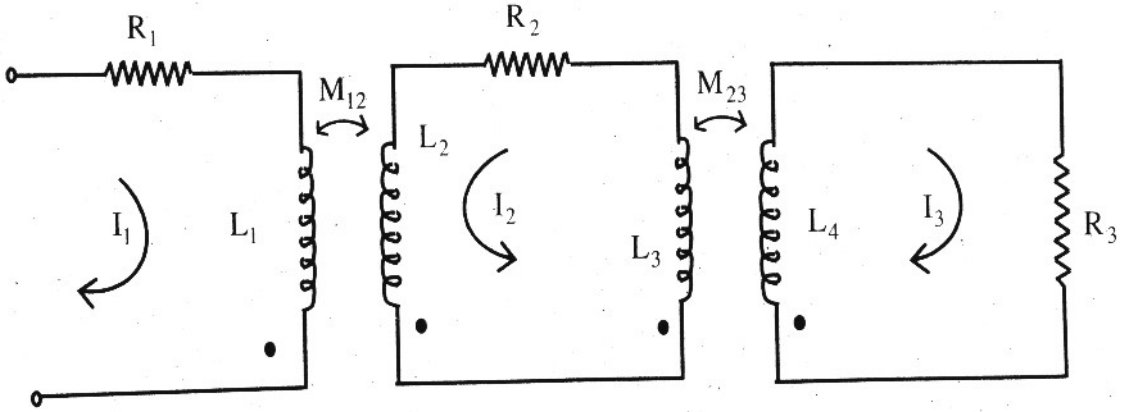


Q.2 (a) Find the transient responses of Series RL and RC Circuit having sinusoidal excitation. [7]

(b) Fig. represents a RC Circuit at t = 0 ; U_C (0) = 10 V. find U_C (t), ic and U(t). [8]



Q.3 (a) Find the net impedance of the Central mesh and, then find the net inpuct impedance in fig. [10]



(b) Short notes on Self-Inductance & Mutual Inductance. [5]

Q.4 (a) Find the Laplace transform of the function $x(t) = \mu(t) - \mu(t - \theta)$ [5]

(b) A function is given by $X(S) = \frac{2(S+2)}{(S+1)(S+3)}$. [10]

Find its Value using the initial and final value theorem.

Q.5 (a) Compute the transmission parameters of the network whose data of Z parameters have been shown in below. [8]

$Z_{11} = 100\ \Omega$, $Z_{21} = 120\ \Omega$

$Z_{12} = 120\ \Omega$, $Z_{22} = 50\ \Omega$

(b) Explain different types of interconnections of two port networks. [7]

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Roll No. _____ Total No of Pages: 3

3E1142

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019

ESC Electrical & Electronics Engineering

3EE3-04 Power Generation Process

Common For EE, EX

Time: 2 Hours **Maximum Marks: 80**

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is co – generation?

Q.2 Define the energy load curve.

Q.3 What is Green house effect?

Q.4 What are fissile and fertile materials?

Q.5 What are the different causes for low power factor in the power system?

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Differentiate the base load & peak load plants.

Q.2 The monthly reading of a consumer's meter is as follows. Maximum demand = 5kW, Energy consumed = 36000kWh, Reactive energy = 23400kVAR.

If the tariff is ₹ 80 per kW of maximum demand plus 8 paise per unit plus 0.5 paise per unit for each 1% of power factor below 86%. Calculate the monthly bill of the consumer.

Q.3 Calculate the most economical power factor when kVA demand is constant.

Q.4 Discuss chronological load curve and load duration curve with suitable examples.

Q.5 Explain the conversion of solar energy into electric energy in a solar power plant through neat schematic diagram.

Q.6 Discuss the necessity of superheated steam and pulverized coal in thermal power plant.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Give a comprehensive comparison of thermal, hydro and nuclear power sources.

Q.2 What is depreciation reserve? Why it is necessary to maintain it? Discuss the methods to calculate the depreciation charges.

Q.3 The daily demands of three consumers are given below:

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Time	Consumer - 1	Consumer - 2	Consumer - 3
12 midnight to 6AM	200W	200W	No Load
6AM to 10 PM	500W	No Load	400W
10AM to 3 PM	300W	800W	1200W
3AM to 8 PM	600W	200W	400W
8AM to midnight	200W	No Load	200W

Plot the load curve and find:

(a) Maximum demand of individual consumer

(b) Load factor of individual consumer

(c) Diversity factor

(d) Load factor of the station

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3E1144

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019

PCC Electrical & Electronics Engineering

3EX4-06 Analog Electronics

EE, EX

Time: 3 Hours **Maximum Marks: 120**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is PIV of a diode in a rectifier circuits?

Q.2 What is Zener diode? Draw its V – I characteristics.

Q.3 What are multistage amplifiers?

Q.4 State Barkhausen's criteria for oscillation.

Q.5 What is an oscillator? How does it differ from an amplifier?

Q.6 What is the Miller Effect?

Q.7 What is the use of Bleeder in Zener voltage Regulator?

Q.8 Why are two transistors used in a Wein Bridge oscillator?

Q.9 What is the advantage of stagger tuned Amplifier?

Q.10 Define the 'T' model of a Bipolar Transistor.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 What do you mean by the peak inverse voltage of the diode? Show that when a capacitor is connected across the load resistance of a half wave rectifier circuit, and then the peak inverse voltage of the diode is approximately twice the peak voltage of the input signals.

Q.2 Draw the input static characteristics curves of a PNP transistor in common emitter configuration. Explain the shapes of these curves qualitatively.

Q.3 Draw and explain the drain and transfer characteristics of an N - channel depletion MOSFET.

Q.4 The mid frequency gain of a RC coupled amplifier is 100. The values of lower and higher cut off frequencies are 100 Hz and 100 kHz. Find the frequency at which the gain reduces to 90.

Q.5 Describe with necessary derivations, the effect of negative feedback on the bandwidth and distortion in an amplifier.

Q.6 Explain the lag and lead compensator using an op – amp.

Q.7 What is the precision circuit? Explain the precision Half – Wave Rectifier in detail.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

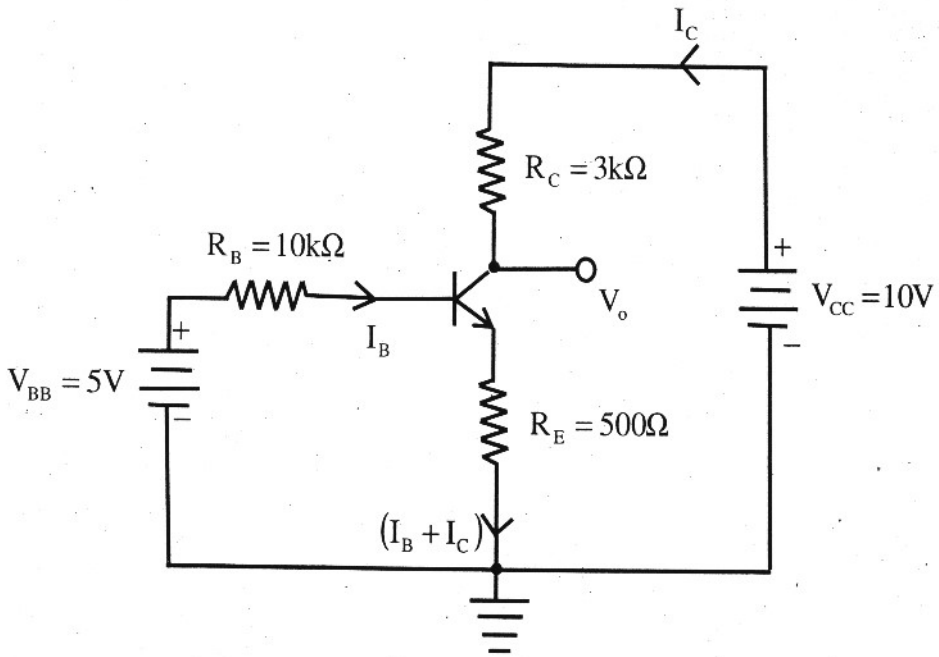
Q.1 It is required to design full wave rectifier with shunt capacitor filter which is capable of supplying 20 Volts d.c. at no load. The regulation of this supply is required to be less than 10% for a full load current of 1 ampere. The maximum ripple is to be less than 3 Volts (peak to peak). Find --

(a) The required secondary rating of the transformer,

(b) The value and voltage rating of the capacitor

(c) The peak forward current and PIV rating of the diodes.

Q.2 For the circuit shown in figure 1, assume $\beta = 100$. Find (a) If the Si transistor is in cutoff, saturation or in active region, (b) output voltage V_o, and (c) minimum value for R_E for which the transistor operates in the active region.



(figure1)

Q.3 Explain the Hybrid π - Model for the CE transistor amplifier. Find the expression for higher cutoff frequency and show that the current gain falls by $\frac{1}{\sqrt{2}}$ times the low frequency gain (or 3 db fall of gain).

Q.4 Draw and explain the working of R – C phase shift oscillator and also derive an expression for its frequency of oscillation.

Q.5 Write a note on following –

(a) Zero crossing detector

(b) Analog to Digital conversion

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3E1146

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019

PCC Electrical Engineering

3EE4-08 Electromagnetic Field

Common For EE, EX

Time: 2 Hours **Maximum Marks: 80**

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 Convert point P (0, 120°, 3) in Cartesian Coordinate.

Q.2 Write the del operator in cylindrical coordinator system.

Q.3 Write the relation of Poisson equation in a dielectric material.

Q.4 What is the value of $\oint B.ds$ inside a magnetic material?

Q.5 Write any two Maxwell equation in point form for dynamic field.

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Find the value of curl at point P (5, 90°,1) due to the vector

$A = 2rz \sin\phi\ a_r + 3z^2 \cos\phi\ a_o$. Also calculate the work done in moving a charge 50nC from origin to point P.

Q.2 Find the expression of Energy density in static magnetic and electric field.

Q.3 Using Maxwell's equation find the EM wave equation for free field. Draw the pattern of EM field for free space and also define the wave impedance.

Q.4 Express the integral form of all Maxwell's equation for:

(1) Time varying field in perfect dielectric medium.

(2) Time varying field in perfect conducting medium.

Q.5 Explain the change in normal and tangential component of electric field at the interface of two dielectric medium. If a electric field $E = 2i + 40\ k$ is enter from medium one to medium two at $z = 2$ plane, then find the field in second medium. Assume $\varepsilon_{r1} = 4$ and $\varepsilon_{r2} = 1$.

Q.6 What is pointing vector? Using it find the time average power flow by an EM wave whose electrical field is :

$E = 40 \sin (2\pi \times 10^6 t - 0.8x)\ a_z$ V/m. Also find the total power crossing 50 cm^2 of plane $x + y = 5$.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 State and Prove divergence theorem.

(1) Draw the pattern of magnetic field in which the divergence zero and

(2) Draw the pattern of electric field in which divergence non zero.

Q.2 The electric field intensity of a uniform plane wave in a lossless medium ($\sigma = 0$, $\varepsilon = \varepsilon_0$, $\mu = \mu_0$) is $E = 120 \sin (2\pi \times 10^6 t - 0.3y)\ a_z$ V/m.

Determine its -

(1) Polarization,

(2) Magnetic field intensity,

(3) Relative dielectric constant ε_r and

(4) Frequency

Q.3 Using Laplace equation find the expression of electric field between the two conductor of a Co – axial cable. Assume the cable is running along z – axis, the inner conductor is at 230 Volt and outer conductor is at zero Volt. Also find the expression of capacitor per unit length of this cable.

3E1646

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3E1646

B. Tech. III - Sem. (Back) Exam., Dec. 2019
Electrical & Electronics Engineering
3EX6A Advanced Engineering Mathematics-I
EE, EX

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 26

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) Find the Laplace Transform of $\sin\sqrt{t}$. Hence deduce – [8]

$$L\left(\frac{\cos\sqrt{t}}{\sqrt{t}}\right) = \left(\frac{\pi}{s}\right)^{1/2} e^{-1/4s}$$

(b) By using Laplace transform solve the differential equation – [8]

$$(D^2 - 3D + 2)x = 1 - e^{2t}, \quad \begin{matrix} x(0) = 0 \\ x^1(0) = 0 \end{matrix}$$

OR

Q.1 (a) Find Inverse Laplace transform of – [8]

$$\frac{s}{s^4 + 4a^4}$$

(b) Solve the Partial differential equation by using Laplace transform method – [8]

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2},\ u(x, 0) = 3\sin 2\pi x u\ (0, t) = 0, u(1, t) = 0 \text{ where } 0 < x < 1$$

$t > 0$

UNIT- II

Q.2 (a) Find f(x) if its Fourier sine transform is $\frac{1}{s}e^{-as}$. Hence deduce $F^{-1}\left(\frac{1}{s}\right)$ [8]

(b) Find Fourier transform of the following – [8]

$$f(x) = \begin{cases} 1 - x^2 & |x| \leq 1 \\ 0 & x > 1 \end{cases}$$

and use it to evaluate $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cdot \cos\frac{x}{2}\, dx$

OR

Q.2 (a) Find Fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$ [8]

(b) Solve the following Partial differential equation by using Fourier cosine transform [8]

$\frac{\partial\theta}{\partial t} = c^2\frac{\partial^2\theta}{\partial x^2}$, subject to the condition

(i) $\theta = 0$ when $t = 0 \quad x \geq 0$

(ii) $\frac{\partial\theta}{\partial x} = -\mu$ (constant) when $x = 0, t > 0$. Assume that $\theta(x, t)$ and $\frac{\partial\theta}{\partial x}$ both tend to zero as $x \to \infty$.

UNIT- III

Q.3 (a) Find a plain curve of fixed perimeter and maximum area. [8]

(b) Find the extremals of the functionals – [8]

$$V[y(x), z(x)] = \int_0^{\pi/2}\left(y'^2 + z'^2 + 2yz\right)dx$$

given that $y(0) = 0,\ y\left(\frac{\pi}{2}\right) = -1,\ z(0) = 0,\ z\left(\frac{\pi}{2}\right) = 1$

OR

Q.3 (a) Find Fourier series for the function $f(x) = x + x^2$ in the interval $-\pi < x < \pi$ [8]

Hence show that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \cdots$

(b) Obtain the constant term and the co – efficient of first sine and cosine terms in the Fourier series that represents y as given in the table. [8]

x	0	1	2	3	4	5
y	9	18	24	28	26	20

UNIT- IV

Q.4 (a) Determine the analytic function whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 2x + 1$. Also prove that the given function satisfy the Laplace equation. [8]

(b) If f(z) is a regular function of z , prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |f(z)|^2 = 4|f'(z)|^2$ [8]

OR

Q.4 (a) State and Prove Cauchy's Integral formula. [8]

(b) Evaluate the following integrals –

(i) $\oint_c \frac{z \cos z}{\left(z-\frac{\pi}{2}\right)^2} dz$, where c is circle $|z - 1| = 1$ [4]

(ii) $\oint \frac{1-2z}{z(z-1)(z-2)} dz$, where c is circle $|z| = 1.5$ [4]

UNIT- V

Q.5 (a) Explain $\frac{1}{z(z^2 - 3z + 2)}$ in Laurent series for the region –

(i) $0 < |z| < 1$ [4]

(ii) $1 < |z| < 2$ [4]

(b) Find the poles of the function $f(z) = \frac{e^z}{z(z+1)^2}$. Also find the order of each Pole and residue at it. [8]

OR

Q.5 (a) Evaluate $\oint \frac{z^2-2z}{(z+1)^2(z^2+4)} dz$, where c is the circle $|z| = 3$. [8]

(b) By using Method of Contour integration – [8]

Evaluate $\int_0^{2\pi} \frac{d\theta}{2 + \cos\theta}$

3E1642

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3E1642

B. Tech. III Sem. (Back) Exam., Dec. 2019

Electrical Engineering

3EE2A Circuit Analysis-I

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

Min. Passing Marks: 26

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.*

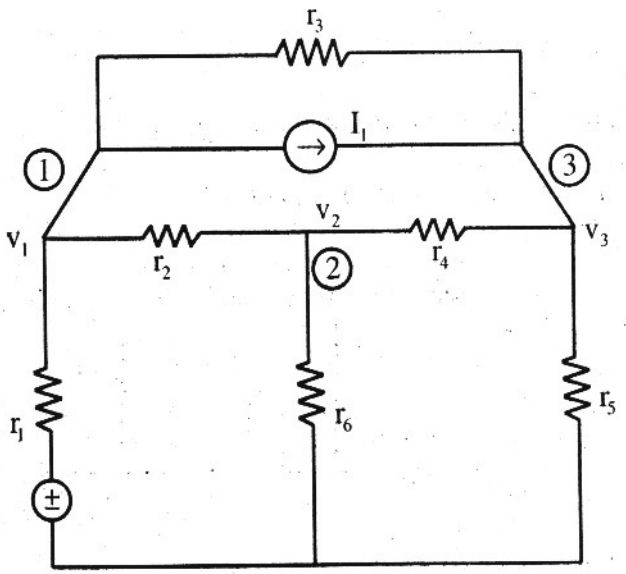
Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

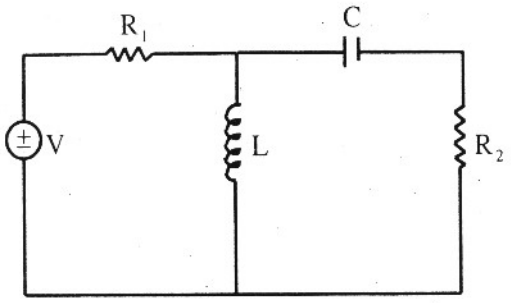
1. NIL 2. NIL

UNIT- I

Q.1 (a) Develop nodal equations in node (1), (2) & (3) in the circuit of fig - [8]



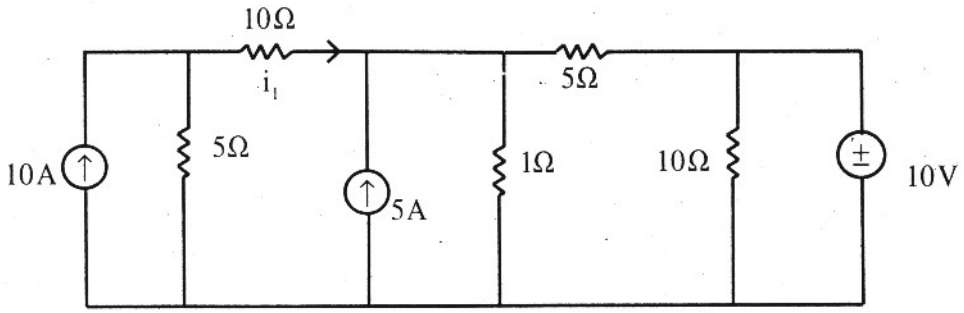
(b) Draw the dual of the network shown in fig – [8]



OR

Q.1 (a) Define Q factor in an AC circuit. Deduce the relation between band width, resonant frequency and Q – factor? [8]

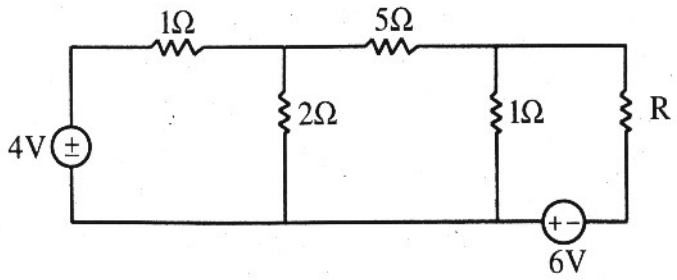
(b) Obtain the current I_1, using KVL [8]



UNIT- II

Q.2 (a) State and explain Reciprocity theorem? [8]

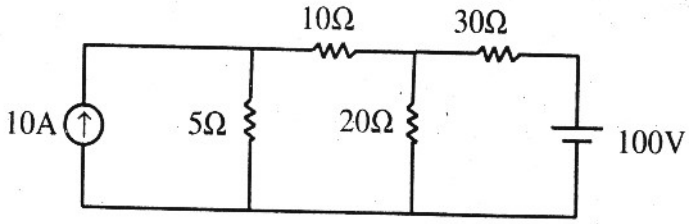
(b) Find the value of R in the given figure, such that maximum power transfer takes place. What is the amount of this power? [8]



OR

Q.2 (a) State and prove Miller's theorem? [8]

(b) Using Thevenin theorem, find the current through the 10 Ω Resistor: [8]



UNIT- III

Q.3 (a) Give short note on - [8]

(i) Power Factor

(ii) Reactive Power

(iii) Apparent Power

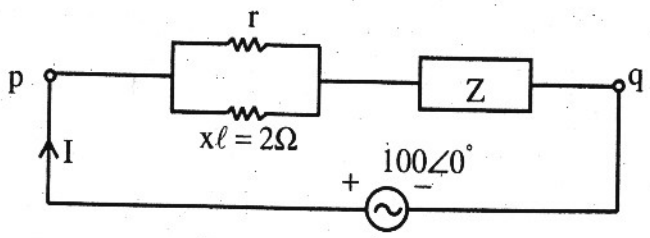
(iv) Power Triangle

(b) Explain the neat circuit and phasor diagram, how the power and power factor of 3 - ϕ system can be measured by means of two watt meter method? [8]

OR

Q.3 (a) Give the relationship between line and phase voltages and current in a star connections? [8]

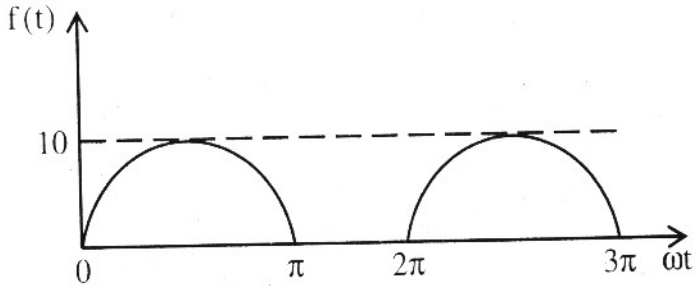
(b) A voltage of 100 ∠ 0° Volts is applied across p–q terminals of the circuit shown in Fig. to produce current of 40 ∠ 10° A. Find the value of Z, when r = 5Ω. What would be the active power consumed in Z? [8]



UNIT- IV

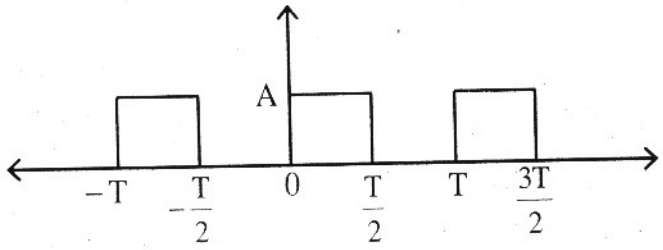
Q.4 (a) Explain different kinds of symmetry in non-sinusoidal waves? [8]

(b) Obtain the Fourier Coefficients of the waveforms shown in figure – [8]



OR

Q.4 (a) A square wave form is shown below. Obtain the Fourier series. [8]



(b) Derive the expression of power with Non-sinusoidal voltage and current. [8]

UNIT- V

Q.5 (a) State and deduce initial value and final value theorems? [8]

(b) Explain step response of RL series circuit? [8]

OR

Q.5 (a) Find the inverse of the Laplace transform - [10]

$$f(s) = \frac{s^3+6s^2+11s+7}{s^2+5s+6}$$

(b) Explain the impulse response of series RC network? [6]

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3E1641

B. Tech. III Sem. (Back) Exam., Dec. 2019

Electrical & Electronics Engineering

3EX1A Electronic Devices & Circuits

EC, EIC, EE, EX

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

Min. Passing Marks: 26

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) Explain Fermi – Dirac distribution for semiconductor? Give it mathematical equation At T = 0°K and A t T > 0°K. [8]

(b) What is Fermi level (E_F) in semiconductor? Explain Fermi level with suitable diagram and mathematical expression for intrinsic semiconductor & Externsic semiconductor. [8]

OR

Q.1 (a) Explain Hole – electron pair generation, recombination and temperature coefficient. [8]

(b) (i) Using Avogadro number find the concentration of atom of Germanium. [2]

(ii) Find the resistivity of intrinsic Germanium at 300°K. [2]

(iii) If a donor impurity is added to the extent of 1 part in 10^8 Ge atoms, find the resistivity. [2]

(iv) If Germanium is a monovalent metal, find the ratio of its conductivity to that of the n – type semiconductor in part (iii). [2]

UNIT- II

Q.2 (a) Write short notes on following - [6]

(i) Schottky Diode

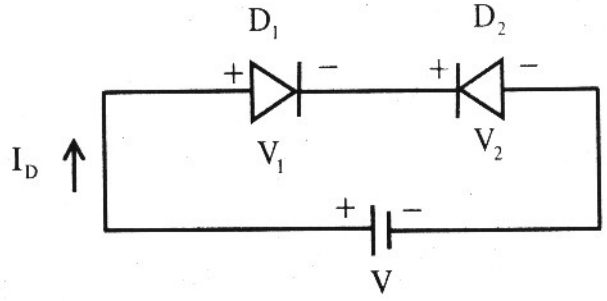
(ii) Breakdown diodes

(iii) Diode parameter and load line concepts

(b) For the Given Circuit Prove-

$e^{qV_1/kT} + e^{-qV_2/kT} = 2$, here n = 1

Also find current and voltage across each diode when V = 5V and V_T = 26 mv. [10]



OR

Q.2 (a) Explain formation of homogenous and hetrojunction diodes and their energy band diagram. [8]

(b) Draw V – I characteristics of P–N junction diode and mention the following within the characteristics – [8]

(i) Statics and dynamic resistance

(ii) I_o and cut in voltage

(iii) Effect of temperature for highly and lightly doped P – N junction

UNIT- III

Q.3 (a) Explain various junction voltage of transistor- [8]

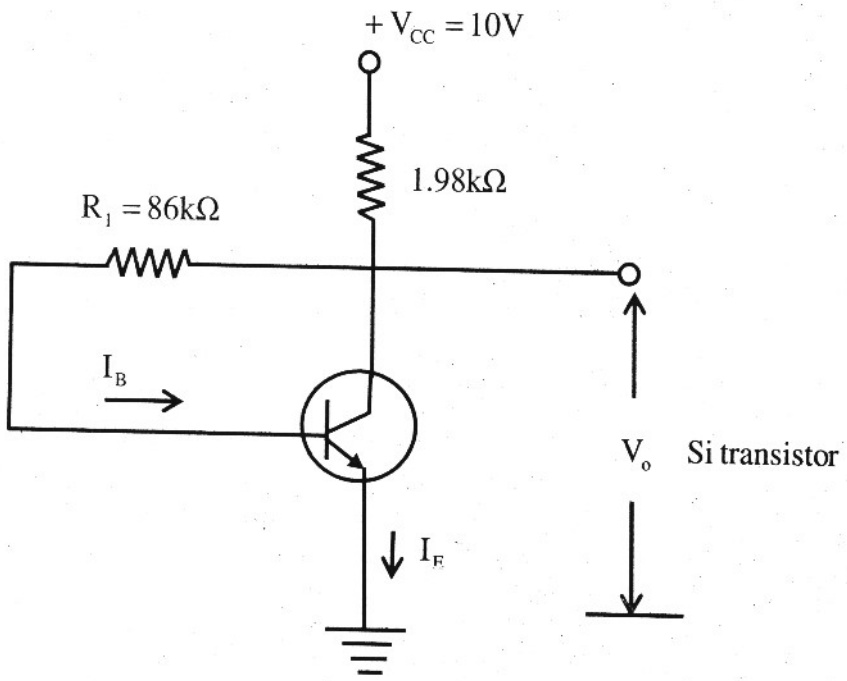
(i) Cut off voltage

(ii) Cut in voltage

(iii) Active voltage

(iv) Saturation voltage (Give the different junction voltage for Ge and Si at room temperature)

(b) Find out the output voltage for the Circuit shown below for the following values $h_{fe} = 50$, $V_{CC} = 10$ Volts. [8]



OR

Q.3 (a) Explain the relationship among Hybrid - π parameter and h – parameter at low frequency. [10]

(b) For a certain transistor $I_C = 5.255$mA, $I_B = 100\ \mu$A and $I_{CBO} = 5\mu$A, calculate α, β and I_E. [6]

UNIT- IV

Q.4 (a) Write short notes on the following - [8]

(i) Advantages of FET

(ii) Difference between MOSFET and FET

(b) For a P – channel silicon FET with a 2×10^{-4} cm and channel resistivity $\rho = 10\Omega$ -m [8]

(i) Find the pinch – off voltage.

(ii) Repeat (i) for a P – channel Germanium FET with $\rho = 2\Omega$ cm.

OR

Q.4 (a) Draw the small signal equivalent circuit of FET Amplifier in CS connection and derive the equation of voltage gain? [8]

(b) Two MOSFETs having drain resistance of rd_1 and rd_2 and amplification factors of μ_1 and μ_2 respectively are connected in parallel, show that- [8]

(i) $\frac{1}{rd_1} + \frac{1}{rd_2} = \frac{1}{rd}$

(ii) $\mu = \left(\frac{\mu_1 rd_2 + \mu_2 rd_1}{rd_1 + rd_2}\right)$ Here rd and μ are equivalent resistance and amplification factor respectively.

UNIT- V

Q.5 (a) Draw the circuit diagram of Darlington Amplifier. Give the main characteristics, merits and application- [10]

(b) Give only mathematics equation on following - [6]

(i) Differential Gain (A_d)

(ii) Common mode gain (A_C)

(iii) Common mode Rejection ratio (CMRR) for differential Amplifier.

OR

Q.5 (a) A 2 stage RC coupled Amplifier has input resistance of each stage as 1 kΩ. Collector resistance R_C = 1kΩ and β = 50. Calculate- [8]

(i) Voltage gain of first stage

(ii) Voltage gain of second stage

(iii) Total voltage gain

(b) Explain transistor R – C coupled Amplifier with special reference to frequency response, advantages, disadvantages and application. [8]

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3E1645

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3E1645

B. Tech. III Sem. (Back) Exam., Dec. 2019

Electrical Engineering

3EE5A Electrical Machines –I

EE, EX

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) Explain analogy between Electric and Magnetic circuits. [8]

(b) Explain principle of Electromechanical Energy conversion and give its general representation. [8]

OR

Q.1 (a) Discuss permanent magnets and their applications. [8]

(b) Explain the phenomenon of Energy balance. Derive an expression for energy stored in magnetic circuit. [8]

UNIT- II

Q.2 (a) Derive e.m.f. equation for DC generator. Explain briefly types of DC generators. [4+4=8]

(b) What do you mean by Commutation in DC Machine? Explain the method of improving commutation. [4+4=8]

OR

Q.2 (a) Explain various characteristics of Shunt, Series and Compound generators. [8]

(b) Explain Demagnetizing and Cross magnetizing ampere turns in DC generators. [8]

UNIT- III

Q.3 (a) Explain characteristics of Shunt, Series and compound DC motors. [8]

(b) Explain Swinburne's test of DC motor with the help of suitable diagram. [8]

OR

Q.3 (a) Explain any one method of speed control of DC motor with Suitable diagram. [8]

(b) Explain the various methods of braking of DC motors. [8]

UNIT- IV

Q.4 (a) Discuss back to back (Sumpner's test) test on Single-Phase transformers. [8]

(b) A transformer has its maximum efficiency of 0.98 at 15 kVA at upf. Compare its all day efficiencies for the following load cycles – [8]

(i) Full load of 20 kVA 12hours/day and no load rest of the day.

(ii) Full load 4 hours/day and 0.4 full load rest of the day.

Assume the load to operate on upf all day.

OR

Q.4 (a) Explain about auto-transformer with suitable diagram. [8]

(b) Explain brief the following –

(i) Welding transformer [4]

(ii) Potential transformer [4]

UNIT- V

Q.5 (a) Discuss following in respect to three – phase transformer –

(i) Open delta Connection. [4]

(ii) Scott Connection. [4]

(b) Explain Parallel operation and conditions of three – phase transformers. [8]

OR

Q.5 (a) In poly phase transformers explain three phase to six phase Conversion. [8]

(b) Explain Switching and magnetizing inrush currents in three – phase transformer. [8]

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Roll No. _____ Total No of Pages: 3

3E1145

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019
PCC Electrical & Electronics Engineering
3EX4-07 Electrical Machines-I
EE, EX

Time: 3 Hours **Maximum Marks: 120**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is magnetizing current in transformer?

Q.2 What is meant by permeability of material?

Q.3 What is B – H curve of magnetic material?

Q.4 What are linear and non-linear magnetic circuits?

Q.5 Explain induced e.m.f. in an armature coil.

Q.6 What are lap and wave windings?

Q.7 Explain principle of dc motor.

Q.8 What is meant by back e.m.f.?

Q.9 What is armature reaction in d.c. machines?

Q.10 Explain critical field resistance and critical speed in d.c. generator.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Explain Ampere Law and Biot – Savart Law. Show the magnetic fields produced by bar magnet and by a current carrying coil. Clearly mention the difference between the two.

Q.2 Derive an equation for force developed as a partial derivative of stored energy with respect to motion of a moving element.

Q.3 Derive the equation for torque developed in a d.c. motor.

Q.4 Explain the voltage build -up in a d.c. shunt generator. What are different types of d.c. generators?

Q.5 Sketch the speed – load characteristics of a d.c. -

(i) shunt motor (ii) series motor, and explain them.

Q.6 Explain principle of operation and construction of a single – phase transformer. Derive an expression for the induced e.m.f. of the transformer.

Q.7 Develop the exact equivalent circuit of a 1 – phase transformer. State the various assumptions made.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 (a) State and prove the condition of maximum efficiency of a transformer.

(b) When a 100 kVA, single phase transformer was tested, the following results were obtained:

On open circuit, the power consumed was 1300 W and on short circuit at full load current, the power consumed was 1200W. Calculate the efficiency of transformer on full load and half load, when working at Unity Power Factor.

Q.2 (a) Explain the speed - current, torque – current and speed – torque characteristics of d.c. series motor.

(b) A series motor with total resistance of 0.5Ω, when running at a certain speed takes 60 Amps at 500 Volt. If the load torque varies as the cube of the speed, calculate the resistance required to reduce the speed by 25%.

Q.3 (a) What do you mean by linear communication, under communication and over communication in a d.c. machine? Explain.

(b) Explain why the external characteristics of a d.c. shunt generator is more drooping than that of a separated excited generator.

Q.4 Derive an expression for saving in conductor material in an autotransformer over a two winding transformer of equal rating. State the advantage and disadvantages of autotransformer over two-winding transformers.

Q.5 (a) Explain the influence of highly permeable materials on magnetic flux lines, with the help of diagrams.

(b) Explain Ohm's law for magnetic circuits.
