QP code : 10066948

SE sem III Electrical R-19 Cscheme

1/11/24

Duration – 3 Hours **Total Marks - 80**

N.B.: - (1) Question No.**1** is compulsory.
(2) **Attempt** any **Three** questions out of the remaining **five** questions.
(3) Assume suitable data if necessary and justify the same.

Q 1. **Answer any four questions.**

A) Discuss in details skin effect with a neat diagram **05**

B) State the advantages and disadvantages of Solar cell power generation **05**

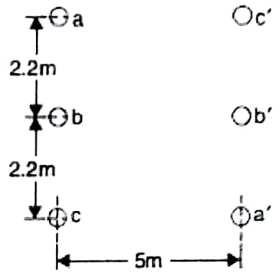
C) State the advantages of Suspension type insulators **05**

D) Define string efficiency? Illustrate the any one method of improving string efficiency **05**

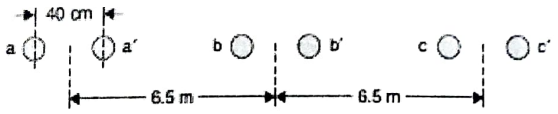
E) Discuss one line diagram along with its advantages. **05**

Q 2 a) Derive the induactance of single phase two wire transmission line. **10**

Q 2 b) A 3-phase double circuit line is shown in Fig. The diameter of each conductor is 2 cm. Determine the capacitance and charging current for a 200km length of the line, assume that the line is transposed and the operating voltage 220 kV. **10**



Q 3 a) A single circuit 460 kV line using two bundle conductors per phase as shown in Fig. The dia. of each conductor is 5.0 cm. determine, inductance per phase per km. **10**



Q 3 b) Derive the expression for capacitance of three phase transmission line with unsymmetrical spacing **10**

Q 4 a) Draw the equivalent circuit representation and phasor diagram of a medium transmission line in Nominal pi method. Derive the expressions for its A, B, C, D constants also, analyse its validity for two port network. **10**

Q 4 b) **10**

A 3-phase line 3 km long delivers 3000 kW at a p.f. 0.8 lagging to a load. The resistance and reactance per km of each conductor are 0.4 Ω and 0.3 Ω respectively. If the voltage at the supply end is maintained at 11 kV, calculate: (i) receiving end voltage (line-to-line) and (ii) Transmission efficiency

Q 5 a) Develop the expression of string efficiency for 2 disc insulators string. **10**

Q 5 b) The three bus-bar conductors in an outdoor substation are supported by units of post type insulators. Each unit consists of a stack of 3 pin type insulators fixed one on the top of the other. The voltage across the lowest insulator is 13.1 kV and that across the next unit is 11 kV. Find the bus-bar voltage of the station. Also calculate the string efficiency **10**

Q 6 a) Write short note on following (i) step and touch potential (ii) neutral grounding and its method. **10**

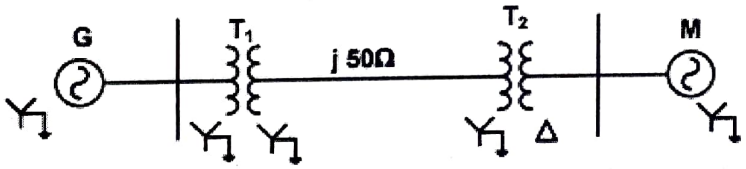
Q 6 b) Figure shows one-line diagram of a power system. Draw impedance diagram of the network. Choose a base of 50MVA, 33kV for generator. Ratings of the equipment are: **10**

Generator: 50 MVA, 33kV, X'' = 20%

Syn. Motor: 50 MVA, 11kV, X'' = 30%

Transformer T1: 50 MVA, 33/220kV, X= 15%

Transformer T2: 50 MVA, 11/220kV, X = 15%



SE Sem III rd R-19 cscheme Electrical QPcode: 10065501

III/Electrical/FEMM 30/11/2024

(3 Hours) **Total Marks: 80**

N.B: (1) Question No. 1 is compulsory.
(2) Attempt any three from the remaining questions.
(3) Figures to the right indicate full marks.
(4) Each question is of 20 Marks

Q.1	Attempt **any 4** questions	**20**
A	Explain difference between series and parallel magnetic circuit.	**5**
B	What is RMF and how it is produced.	**5**
C	Explain regenerative braking in dc motor	**5**
D	Differentiate between active and passive transducers. Give examples of each.	**5**
E	Draw Kelvin's double bridge.	**5**
Q.2A	Explain the concept of doubly excited system and derive the expression for the electromagnetic torque.	**10**
B	What is Armature reaction? Explain with neat diagram. Derive formula for demagnetising and cross magnetising Ampere turns.	**10**
Q.3A	Explain working principle and construction of PMMC instruments. Also derive expression for deflecting and controlling torque.	**10**
B	Explain working and construction of DSO.	**10**
Q.4A	With next diagram describe working of Thermistor, thermocouple and LVDT.	**10**
B	What are the similarities between electric and magnetic circuit? Explain the difference between electric and magnetic circuit.	**10**
Q.5A	Explain following terms i) Resolution ii) Sensitivity iii) Accuracy iv) Backlash v) Precision.	**10**
B	Explain in brief the principle of electro-mechanical energy conversion and develop a model of electro-mechanical energy conversion device.	**10**
Q.6A	Explain Maxwell's inductance bridge to measure self-inductance, derive the equation of self-inductance and draw phasor diagram.	**10**
B	Illustrate the working of ramp type digital voltmeter (DVM) with the help of block diagram and waveforms	**10**

QP code : 10064760

SE sem-III Electrical R-19 Cscheme

III/Electrical/AE
25/11/2024

Time: 3 Hours **Total Marks: 80**

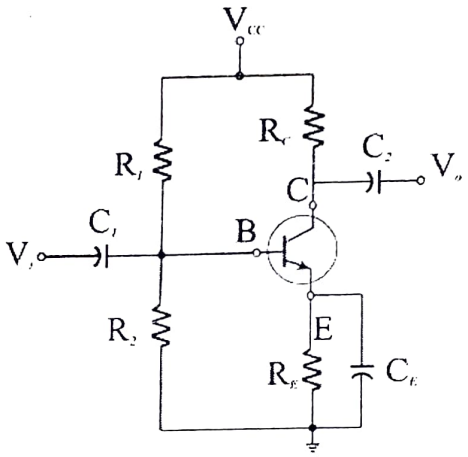
N.B.: All questions are compulsory.

Q1) Answer any FOUR of the following (entire syllabus)

a. Explain Diode as a clipper. **(05)**
b. Explain BJT as a switch. **(05)**
c. Explain the operation of D-MOSFET. **(05)**
d. Explain the Block diagram of an operational amplifier. **(05)**
e. Draw a functional block diagram of IC 555 **(05)**
f. Explain the operation of a Zener diode. **(05)**

Q2)

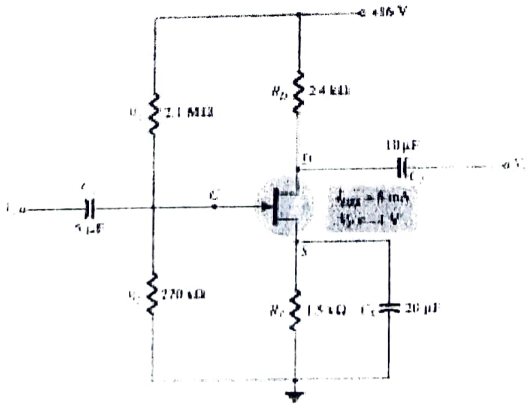
a. Analyse full wave bridge wave rectifier along with 'C' filter. Analyse the impact impact of 'C'filer over ripple factor. **(10)**
b. In the following circuit of BJT CE voltage divider bias calculate the Q point. Given Data: V_{CC}=18 V, R_1= 82KΩ, R_2=22KΩ, R_C=5.6KΩ, R_E=1.2KΩ, β=50 **(10)**



Q3)

a. Perform small signal analysis over a BJT CE amplifier with voltage divider bias using the h-model. Derive an expression for current gain, input impedance, voltage gain and output impedance. **(10)**

b. Find I_{DQ}, V_{GSQ}, V_D, and V_{DS} In the given circuit. **(10)**



Q4)

a. Derive expressions for voltage gain and output impedance of MOSFET CS (Self bias) amplifier circuit. **(10)**

b. Explain Op-Amp as an inverting summing amplifier. **(10)**

Q5)

a. Explain Op-Amp as an instrumentation amplifier. **(10)**

b. Design a voltage regulator using IC LM 317 to produce an output voltage of 12.5 volts. **(10)**

Q6)

a. Write a short note on a Schottky diode and an opto-isolator. **(10)**

b. Explain Op-Amp as a Square wave generator. **(10)**

III | Electrical | ECA
14/11/2024

QP code : 10065677

Paper / Subject Code: 51022 / Electrical Circuit Analysis

SE sem-III Electrical R-19 Cscheme

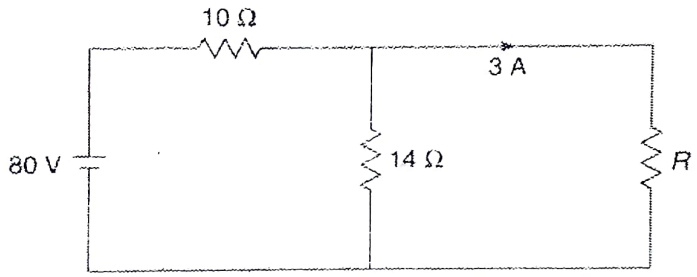
3 Hours Total Marks: 80

Note:

- Question No. 1 is compulsory.
- Answer any **three** from the remaining five questions.
- Assume suitable data if necessary and justify the same.

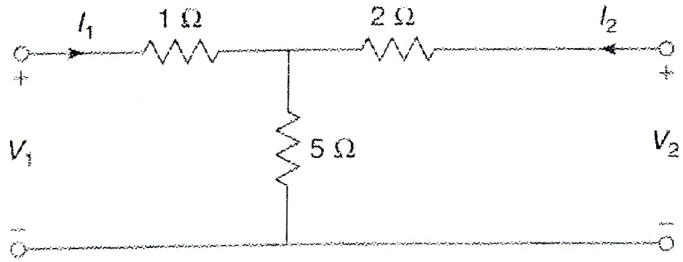
Q1 Each question carries five marks **20M**

a Determine the resistance 'R' in the following circuit

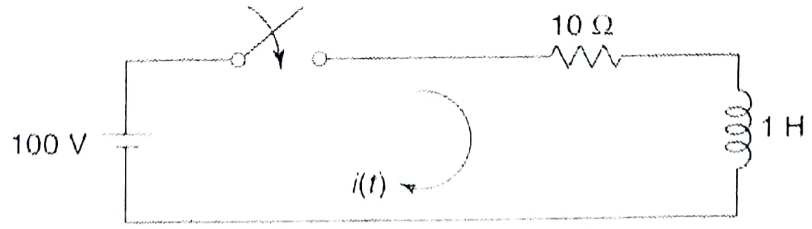


b What are the restrictions on pole and zero locations for Transfer Functions?

c For the given network, determine the transmission parameters

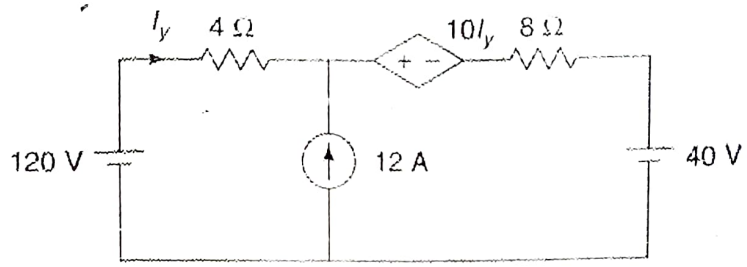


d In the given network switch is closed at $t=0$. With zero current in the inductor, find i and $\frac{di}{dt}$ at $t=0+$

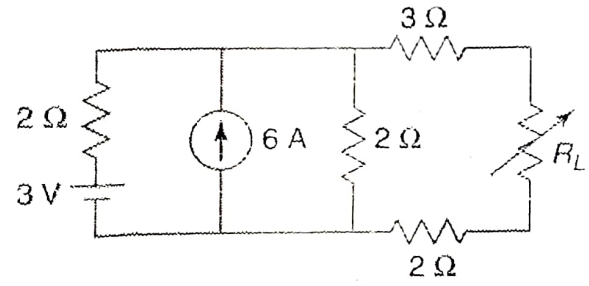


Q2 a Derive Z parameters in terms of Y parameters and hybrid parameters **10M**

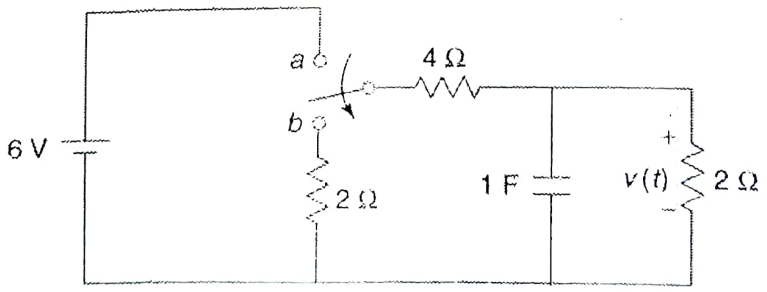
b Find the current I_y in the following circuit using Superposition theorem. **10M**



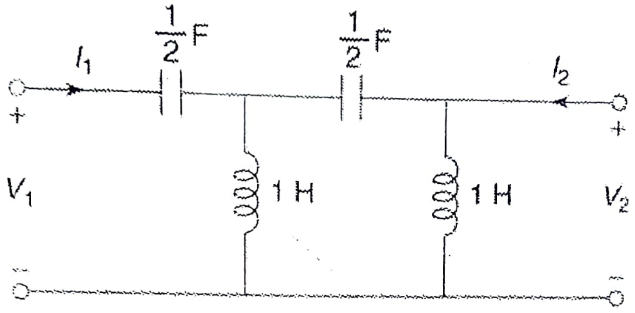
Q3 a Find the value of the resistance R_L in the following circuit, for maximum power transfer, and calculate the maximum power. **10M**



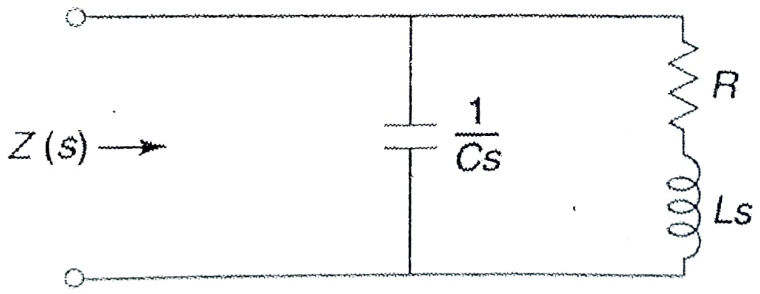
b For the given network the switch is moved from a to b, at t = 0. Determine V(t) using Laplace Transform. **10M**



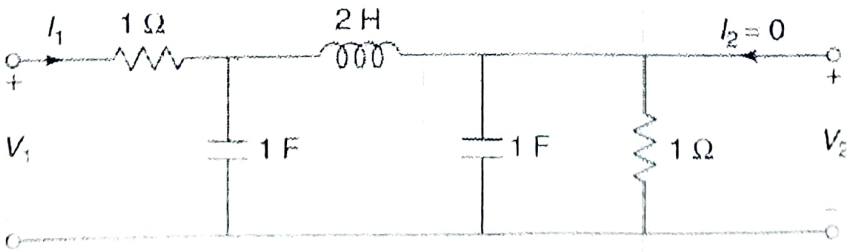
Q4 a Determine hybrid parameters of the given network. **10M**



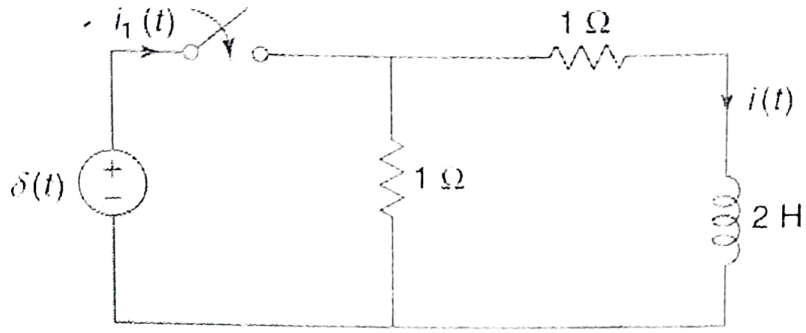
b The voltage V(s) of a network is given by $V(s) = \frac{3s}{(s+6)(s^2+3s+3)}$. Plot its pole zero diagram and hence obtain v(t). For the given network, poles and zeros of driving point function Z(s) are, Poles: (−1 ± j4); zero: −2. If Z (j0) = 1, determine the values of R, L and C. **10M**



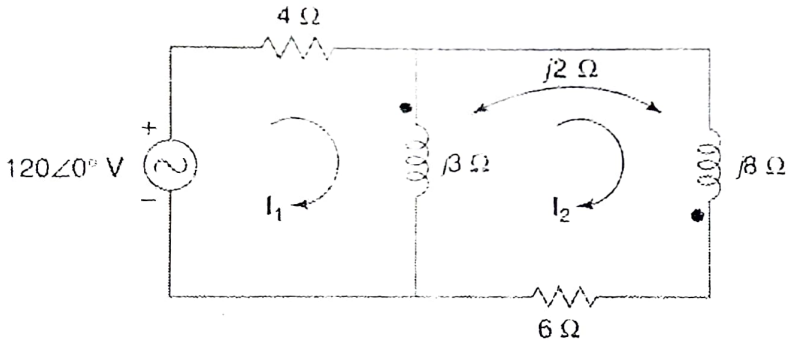
Q5 a For the given ladder network, determine the voltage transfer function V_2/V_1 **10M**



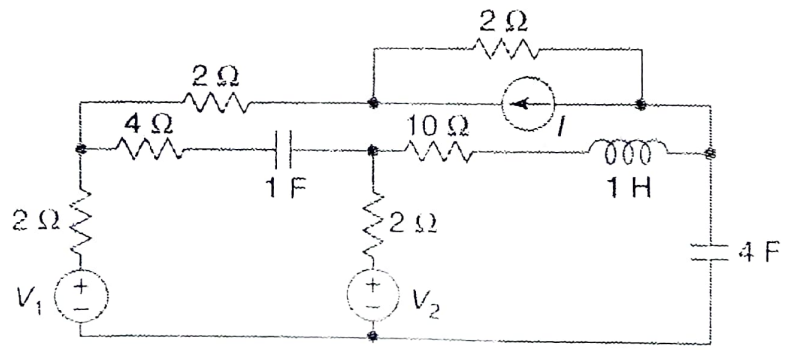
b Determine the impulse response of the current i(t) in the following network. **10M**



Q6 a Find the current through the 6Ω resistor in the following circuit using mesh analysis. **10M**



b For the given network draw oriented graph and write the (i)reduced incidence matrix (ii) tieset matrix and (iii) fundamental cutset matrix. **10M**



QP code:10065882

SE sem-III Electrical R-19 C scheme

(3 hours) (Total Marks:80)

III / Electrical / EM-III
12/11/2024

N.B: (1) Question no.1 is compulsory.
(2)Attempt any three questions from remaining five questions.
(3)Figures to the right indicate full marks.
(4) Assume suitable data if necessary.

1.(a) Find the Laplace Transform of $f(t) = te^{-4t}\sin 3t$. **(05)**

(b) If $A = \begin{bmatrix} -1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 0 & -2 \end{bmatrix}$, find the eigen values of $A^3 + 5A + 8I$. **(05)**

(c) Find half-range sine series for $f(x) = x, x \in (0, \pi)$. **(05)**

(d) Find the constants a, b, c, d, e if $f(z) = (ax^3 + bxy^2 + 3x^2 + cy^2 + x) + i(dx^2y - 2y^3 + exy + y)$ is analytic. **(05)**

2.(a) Evaluate $\int_0^\infty \frac{e^{-t}\sin t}{t}\,dt$ using Laplace Transform. **(06)**

(b) Show that the function $v = 3x^2y + 6xy - y^3$ is harmonic and find the corresponding analytic function f(z) in terms of z. **(06)**

(c) Find the Fourier Series for $f(x) = x^2, x \in (0, 2\pi)$ and hence, deduce that **(08)**
$\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots$

3.(a) Verify Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ hence find A^{-1} and A^4. **(06)**

(b) If $\bar{F} = (x + 2y + az)\,i + (bx - 3y - z)\,j + (4x + cy + 2z)\,k$ is irrotational, then find a, b, c. **(06)**

(c) Find the orthogonal trajectories of the family of curves given by $x^3y - xy^3 = c$. **(08)**

4.(a) Use Gauss's Divergence Theorem to evaluate $\iint \overrightarrow{N}.\vec{F}\,ds$ where $\vec{F} = 4xi - 2y^2j + z^2k$ and s is the surface of the region $x^2 + y^2 = 4, z = 3$ above xy plane. **(06)**

(b) Find the inverse Laplace Transform of $ln\left[\frac{s^2+a^2}{s^2+b^2}\right]$ **(06)**

(c) Show that the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ is diagonalisable. Find the transforming and diagonal matrix. **(08)**

5.(a) Find the Fourier Series for $f(x) = \begin{cases} x + \frac{\pi}{2}, -\pi < x < 0 \\ x - \frac{\pi}{2}, \ 0 < x < \pi \end{cases}$ **(06)**

(b) Find $L\{\int_0^t u \sin 4u du\}$ **(06)**

(c) Find $L^{-}\{\frac{s^2}{(s^2+1)(s^2+4)}\}$ using Convolution Theorem. **(08)**

6.(a) Evaluate by Green's theorem $\int (e^{-x} \sin y dx + e^{-x} \cos y dy)$ along the curve C, where C is the rectangle with vertices $(0,0), (\pi, 0), \left(\pi, \frac{\pi}{2}\right), \left(0, \frac{\pi}{2}\right)$. **(06)**

(b) Find the inverse Laplace Transform of $\frac{s+29}{(s+4)(s^2+9)}$. **(06)**

(c) Find the eigen values and eigen vectors of $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ **(08)**

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