QP code: 10067017

TE sem V Electrical R-19 C scheme

(3 Hours) [Total Marks: 80]

N.B. 1) Question No. 1 is compulsory
2) Attempt any three of the remaining Questions No. 2 to No. 6.
3) Illustrate answers with diagrams wherever necessary.
4) Assumptions made should be clearly stated.

Q 1. Solve any four

a) Explain the term coil span factor(Kc) and pitch factor (Kd). 05

b) Define the term Synchronous impedance and voltage regulation of an alternator. 05

c) What do you mean by synchronization of alternators? Describe any one method of synchronizing. 05

d) Explain why the synchronous motor is not self-starting. 05

e) Write a note on Steady-state analysis of synchronous machines. 05

Q 2. a) Derive the E.M.F equation for an alternator. Also, draw the equivalent circuit of the alternator. 10

b) A 550 V, 55 KVA, three-phase, star-connected alternator has an effective resistance of 0.2 ohms per phase. A field current of 10 A produces an armature current of 200 A on a short circuit and an emf of 450 V on an open circuit. Calculate the synchronous reactance and voltage regulation at full load power factor 0.8 lagging. 10

Q 3. a) Explain the hunting of synchronous machines. What is the purpose of damper winding in the synchronous machine? 10

b) Two station generators A and B operate in parallel. Station capacity of A is 50 MW and that of B is 25 MW. The full-load speed regulation of station A is 3% and station B is 3.5%. Calculate the load sharing if the connected load is 50 MW. The no-load frequency is 50 Hz. 10

Q 4. a) Explain V-curves and inverted V-curves of synchronous motors. 10

b) Describe the slip test method for the measurement of Xd and Xq of synchronous machine. 10

Q 5. a) Explain Blondel's two-reaction theory of salient-pole synchronous machines. 10

b) A 1500 KVA, Star connected, 2300 V, 3 phase, Salient pole synchronous generator has reactances Xd= 1.95 Ohms and Xq=1.40 ohms per phase. All losses may neglected. Find the excitation voltage for operation at rated KVA and power factor of 0.85 lagging. 10

Q 6. Solve any two. 20

a) Explain different starting methods used for synchronous motors.

b) What is an infinite bus? state the characteristics of an infinite bus.

c) Derive the basic machine relation in dq0 Variables.

QP code: 10067841

TE Sem V Electrical R-19 C scheme

Duration – 3 Hours V/Elect/EPS-II 13/11/2024 **Total Marks - 80**

College CAP

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 **all questions**.

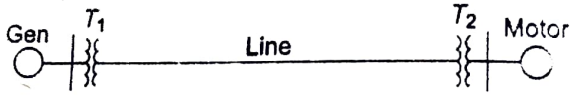
A) Differentiate between Symmetrical and Unsymmetrical Faults. **05**

B) Define Insulation Coordination with volt-time curve. **05**

C) Discuss Lightning Phenomenon with neat labelled diagrams. Define Tower Footing resistance. **05**

D) Why ground wires are provided on top of the Transmission lines ? **05**

Q 2 a) A synchronous generator and synchronous motor each rated at 25 MVA and 11KV having 15 % sub transient reactance are connected through transformer and line as shown. The transformer is rated for 25 MVA 11/66 KV and 66/11 KV with leakage reactance of 10%. The line has reactance of 10% on the base of 25 MVA and 66 KV. The motor is drawing 15 MW at 0.8 pf leading and terminal voltage is 10.6KV .when symmetrical three phase fault occurs at the terminal of motor. Find the sub transient current in generator, motor and fault. **10**



Q 2 b) Derive Fortescue theorem for Symmetrical fault analysis. **10**

Q 3 a) Explain and draw the zero sequence networks for following types of connections of a three phase transformer **10**

i) Delta-Delta
ii) Delta-Star(ungrounded)
iii) Delta-Star(Grounded)
iv) Star(Grounded)- Star(Grounded)
v) Star(ungrounded)- Star(ungrounded)

Q 3 b) A three phase 50 MVA, 11 kV generator is subjected to various faults and the currents so obtained in each fault are: 2000 A for a three phase fault; 1800 A for a line-to-line **10**

fault and 2200 A for a line-to-ground fault. Find the sequence impedances of the generator.

Q 4 a) Discuss the operation of synchronous machine on loaded condition with waveform equation and equivalent circuit diagram. **10**

Q 4 b) Derive the equation for fault current for Line to Line Fault. State the various assumptions. Draw the sequence network for same. **10**

Q 5 a) Why Insulation Coordination is required ? Explain the following : 1. Surge Reactor 2. Surge Capacitor 3. Lightning Rod **10**

Q 5 b) Explain construction and working of following: 1. Thyrite type Surge Arrester 2. Metal Oxide Gapless Arrester **10**

Q 6 a) A delta connected balanced resistive load is connected across an unbalanced three phase supply. where the current in line A is 10A at angle (30 degree) and current in line B is 15A at angle (-60degree). Find the symmetrical components of line currents also find the symmetrical components of delta currents. **10**

Q 6 b) Discuss the formation of Corona. State factors affecting the corona. **10**

QP code: 10065672

TE Sem V Electrical R-19 Cscheme

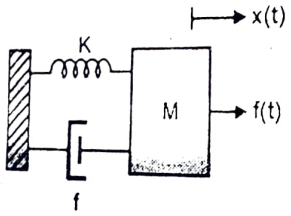
V/Electrical/CS

18/11/2024

(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) Use Graph paper and semi log paper wherever necessary.

1. Attempt **any four** **20**
   (A) Sketch the polar plot of Transfer Function $G(s)=1/S^2$
   (B) Differentiate between open loop and closed loop.
   (C) Find the transfer function X(s)/F(s) for the system.



   (D) Explain transient response specification.
   (E) How to convert a system represented in state space to transfer function.

2 (A) Consider a unity feedback system with closed loop transfer function $C(s)/R(s)=2/(s^2+3s+7)$. Find open loop transfer function. Show that the steady state error in the unit step response is 0.714. **10**

2. (B) Determine the range of operating values of K so that system will be stable for the unity feedback system having characteristic equation as $S^4+4S^3+5S^2+4s+k = 0$ by Routh Hurwitz Method. **10**

3. (A) For the unity feedback system find the steady state error for the following test input of $2+6t$ for $G(s)=1000(S+6)/(S+8)(S+10)$. **10**

3. (B) The unity feedback system is characterized by an open loop transfer system $G(s)= 10/(S+2)(S+5)$. Determine damping ratio, undammed natural frequency of oscillation. What is the percentage overshoot of the response to a unit step input? **10**

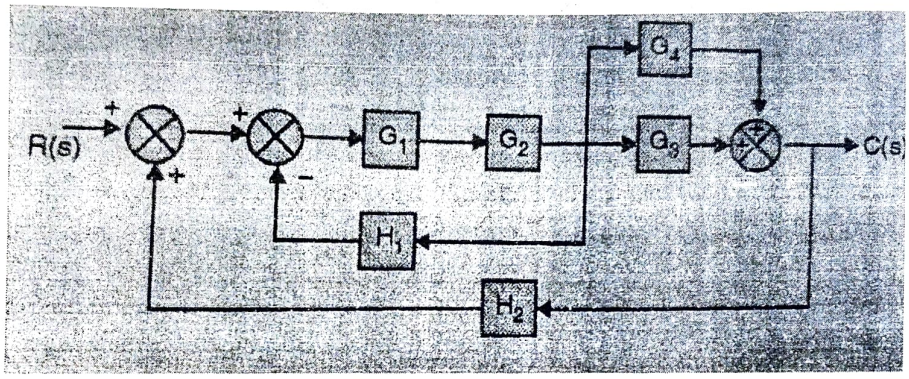
4 (A) Determine gain margin, phase margin, gain crossover frequency and phase cross over frequency for following transfer function: **10**

$$G(s) = \frac{100(s+2)}{s(s+1)(s+4)}$$

4. (B) Sketch the root locus for unity feedback system for the transfer function given below: **10**

$$G(s) = \frac{20}{S(S+2)(S+4)}$$

5. (A) Reduce the block diagram shown to a single block representing the transfer function C(s) / R(s) **10**



5. (B) Represent the following system in state space in phase variable form and draw its state model. **10**

$$G(s) = \frac{100(s+5)}{s(s+1)(s+4)}$$

6. Write notes on **any two**: **20**

(A) Write a short note on State Transition Matrix.

(B) (i)State and explain Nyquist criterion stability

(ii) With the help of polar plot explain the effect of adding poles.

(C) Explain Type 2 system with Step and Ramp input.

7/12/24

QP-10068739

TE | sem V | C-scheme R-19 | Electrical

Duration: 3hrs **[Max Marks: 80]**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q1. Answer any Four from the following [20]

a. Define scalar and vector quantity. Also state coulomb's law.

b. Prove that the electric flux passing through any closed surface is equal to the total charge enclosed by that surface.

c. A uniform line charge of 1 ηC is situated along x-axis between the points (-500,0)mm and (500,0)mm. Find the electric scalar potential V at (0,1000)mm.

d. Explain Lorentz's force equation for moving charge. Enlist it's application

e. Moist soil has a conductivity of 10^{-3} S/m and εr = 2.5. find Jc and Jd where, E = 6.0 x 10^{-6}sin(9.0 x 10^{9}t) V/m.

Q 2. A. Show that the $\overrightarrow{E}$ due to infinite sheet of charge at a point is independent of the distance of that point form the plane containing the charge. [10]

B. In the region 0<r<0.5 m, in cylindrical coordinates the charge density is $\vec{J} = 4.5\ e^{-2r}\ \overrightarrow{az}$ (A/m2) and J = 0 elsewhere. Use Ampere's law to find $\vec{H}$. [10]

Q 3. A. Discuss the phenomenon of polarization in dielectric medium. Also discuss how it gives rise to bond charge densities. [10]

B. Derive the Poission's and Laplace equation. In Cartesian co-ordinate a potential is a function of x only. At $x = -2\ cm, V = 25\ V\ and\ \vec{E} = -1.5 \times 10^{3}\overrightarrow{a_x}\ V/m$ throughout the region. Find V at x=5 cm. [10]

Q 4 A. Derive the set of Maxwell's equations for static fields. [10]

B. Define Biot-Savart's Law. Derive the expression for magnetic field intensity due to infinite wire carrying current I. [10]

Q 5 A. Explain the concept of Magnetic scalar potential [10]

B. Find $\bar{D}, \bar{B}$ *and* $\bar{H}$ displacement current density in free space, given $\bar{E} = E_m \sin(\omega t - \beta z)\overline{a_y}$. [10]

Q 6. A. Formulate wave equation from Maxwell's equation for dielectric medium. [10]

B. A Charge $Q_1 = -20\mu C$ is placed at P(-6,4,6) m and a charge $Q_2 = 50\mu C$ is placed at R(5,8,-2) m in free space. Calculate the exerted force on $Q_2 by\ Q_1$ in vector form. [10]

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QP code : 10065276

Paper / Subject Code: 32025 / Department Level Optional Course-I: Renewable Energy Sources

TE sem V Electrical R-19 cscheme

V/Electrical/RES

22/11/2024

Time: 3 Hours Marks: 80

Note: - 1. Question No. 1 is compulsory
2. Attempt any three questions out of remaining five questions
3. Assume suitable data if necessary & justify the same
4. Figures to the right indicates marks.

Qu.1	Attempt **any Four**.	
(a)	Differentiate between renewable and non-renewable energy sources	[5]
(b)	Discuss the various losses occurs in solar cell.	[5]
(c)	Explains the working of wind energy system along with its various components.	[5]
(d)	Draw and describe the static characteristics of fuel cell in brief	[5]
(e)	Write a short note on wave energy generation	[5]
(f)	Describe the working of liquid flat plate collector. State its advantage.	[5]
Qu.2 (a)	Discuss the effects of different parameters on the performance of liquid flat plate collector?	[10]
(b)	Enlist different types of fuel cell. Explain the working of Molten carbonate fuel cell with neat diagram in detail.	[10]
Qu.3 (a)	Illustrate the significance of MPPT in Solar PV system with neat block diagram. Explain incremental conductance MPPT algorithms with the help of suitable diagram.	[10]
(b)	What are the different methods to use solar thermal energy? How Solar air heater is useful for energy generation? Explain	[10]
Qu.4 (a)	Draw the power converter topology used for double feed induction generators (DFIG) in wind turbines. Explain its working in detail	[10]
(b)	What is charge controller? Define the commonly used set points. Explain Shunt and series type charge controller in brief.	[10]
Qu.5 (a)	Discuss the design methodology of standalone PV system for any one application	[10]
(b)	Brief the methods of power control in WES? Discuss in detail how power control is achieved using Pitch control method.	[10]
Qu.6 (a)	Draw the two junction model of solar cell. Also draw I-V and P-V characteristics of solar cell at STC. Specify the essential parameters on the characteristics. Analyze the impact of change in solar radiation and temperature on solar PV characteristics with a neat diagram	[10]
(b)	Explain the working principle of Tidal energy conversation system with neat diagram.	[10]

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