H.T No: | | | | | | | | | | | **R18** **Course Code: A30211**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech V Semester Supplementary Examinations May-2023

Course Name: POWER SYSTEMS-II

(Electrical & Electronics Engineering)

Date: 09.05.2023 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

1. What is symmetrical configuration of three wire system? 2 M
2. Give the applications of double circuit lines. 2 M
3. What is the shunt capacitance effect in classification of transmission lines? 2 M
4. Give the limitations of nominal T method and give their applications. 2 M
5. What are the disadvantages of corona? 2 M
6. What is Ferranti effect give its causes? 2 M
7. Derive the equation for calculating string efficiency. 2 M
8. What is the impact of wind on weight of conductor? 2 M
9. What are 3-core belted cables explain? 2 M
10. Explain Inter-sheath grading of cables. 2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). i) Derive flux linkage of a conductor in a group of conductors. 5M

ii) Derive the inductance of a conductor per phase of a three phase, three-wire system. When the conductors are arranged at the corners of an equilateral triangle. 5M

OR

11. B). i) What do you understand by transposition of lines? What is the effect on the performance of the line? 5M

ii) Derive the capacitance per phase of a three phase three wire transposed system when the conductors are arranged at the corners of an equilateral triangle. 5M

12. A). Derive A, B, C and D constant of nominal-Π and nominal-T models of medium transmission line. 10M

OR

12. B). i) Explain in detail about the Surge impedance loading of Long transmission lines. 5M

ii) A=D=0.936+j0.016, B=33.2+j138 ohms, C= $(-5.18+j9.14)10^{-6}$ mhos. The load at the receiving end is 50MW at 220kV with a power factor of 0.9 lagging. Find the sending end voltage and regulation of line. 5M

(P.T.O..)

13. A). i) What is Ferranti effect? Deduce a simple expression for the voltage rise of an unloaded line. 5M

ii) A 3-phase 220kV, %0Hz, transmission line consists of 3cm diameter conductors spaced 2 meters apart in equilateral triangle formation. If the temperature is 20^0C and atmospheric pressure 75cm. Determine the corona loss per km of the line. Take irregularity factor as 0.8. 5M

OR

13. B). i) What is skin effect and proximity effect? Explain the methods to reduce their impact on transmission lines? 5M

ii) A 3-phase, 50Hz, 144 kV transmission line has conductors in equilateral formation spaced 2.2 meters apart. The conductor diameter is 1.02 cm and the surface factor is 0.86. The air pressure and temperature are 76cm of Hg and 28^0C respectively. Determine the critical visual voltage for corona and the corona loss per km per phase of the line, mv=0.75. 5M

14. A). Explain classification of line insulators with neat sketch. 10M

OR

14. B). i) Define string efficiency. Why is it necessary to have high string efficiency? How can it be achieved? 5M

ii) A transmission line conductor having a diameter of 19.5mm weight 0.9kg/m. The span is 300 meters. The wind pressure is 40kf/m^2 of projected area with ice coating is 13mm. The ultimate strength of the conductor is 8000kg. Calculate the maximum sag, if the factor of safety is 2 and ice weighs 900kg/m^3? 5M

15. A). i) Derive the expression for capacitance of a single core cable. 5M

ii) A 33kV single core cable has a conductor diameter of 1cm and a sheath of inside diameter 4cm. Find the maximum and minimum stress in the insulation. 5M

OR

15. B). i) Explain various layers of construction of underground cables and their purpose with the help of neat diagram. 5M

ii) Derive the capacitance equation of a single core cable. 5M

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H.T No: | | | | | | | | | | |

R18

Course Code: A30209

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech V Semester Supplementary Examinations May-2023

Course Name: CONTROL SYSTEMS

(Electrical & Electronics Engineering)

Date: 11.05.2023 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

1. Write Mason's gain formula. 2 M
2. Differentiate open loop and closed loop system. 2 M
3. Determine the values of ξ and ω_n for the following system and specify the nature of response with respect the value of ξ 2 M

$$G(s) = \frac{10}{(s+2)(s+5)}$$

4. For the given open loop transfer function estimate the steady state error for unit step input. 2 M

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

5. How centroid of the asymptotes found in root locus technique? 2 M
6. How the damping factor affects the phase margin of the system. Give the mathematical expression of it. 2 M
7. What are the limitations of Proportional (P) controller? 2 M
8. Draw the approximate polar plot for a Type 0 second order system. 2 M
9. List the properties of state transition matrix. 2 M
10. Give the condition for controllability. 2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). i) Why negative feed back is invariably preferred in closed loop system. 5M

ii) Write the differential equations governing the behavior of the mechanical system shown in fig.1 5M

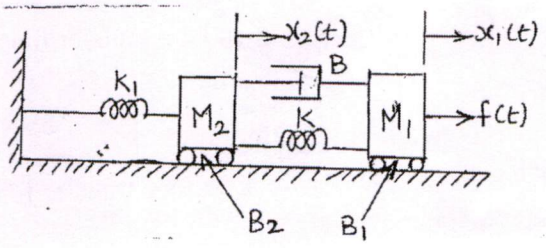

Fig.1

(P.T.O..)

OR

11. B). i) For the block diagram shown in Fig.2 obtain $\frac{C(s)}{R(s)}$ 5M

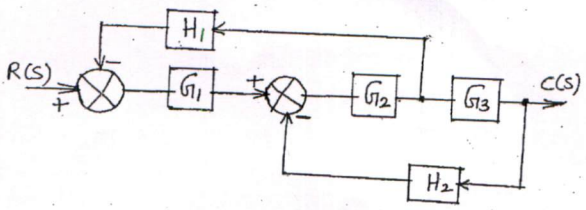

Fig.2

ii) Convert the block diagram shown in Fig.2 into signal flow graph and determine the transfer function using Mason's gain formula. 5M

12. A). i) The open-loop transfer function of a unity feedback system is given by 5M

$$G(s) = \frac{K_1}{s(s+1)+K_2}$$

Determine the values of K_1 and K_2 if the unit step response of the system has damping ratio of 0.6 and damped oscillations of 8 rad/sec.

ii) Derive the expression for the unit step response of Critically damped second order system. 5M

OR

12. B). Calculate the static error coefficients for a system whose transfer function is 10M

$$G(s) = \frac{10}{s(1+s)(1+2s)}$$

And also Calculate the steady state error for $r(t) = 1 + t + t^2/2$

13. A). Sketch the root locus for the system with characteristic polynomial is given by $P(s) = s^3 + 2s^2 + (20K+7)s + 100K$. 10M

OR

13. B). Draw the bode plot for a unity feedback system characterized by open loop transfer function. 10M

$$G(s) = \frac{K(1+0.2s)(1+0.025s)}{s^3(1+0.001s)(1+0.005s)}$$

Show that the system is conditionally stable. Find the range of values of K for which system is stable.

14. A). Draw the Nyquist plot for the system whose open loop transfer function is $G(s)H(s) = \frac{K}{S(S+2)(S+10)}$ 10M

OR

14. B). Consider a type-1 unity feedback system with open loop transfer function 10M

$$G(s) = \frac{K}{s(s+2)}$$

It is specified that $K_v = 20$ sec^{-1} and PM = 50°. Design a suitable lead compensator to meet the specifications.

(P.T.O.)

15. A). Express the canonical state model of the system, whose transfer function is 10M

$$T(s) = \frac{2(s+5)}{(s+2)(s+3)(s+4)}$$

OR

15. B). Examine the controllability and observability of the following state space system 10M

$$\dot{x_1} = x_2 + u_2$$
$$\dot{x_2} = x_3$$
$$\dot{x_3} = -2x_2 - 3x_3 + u_1 + u_2$$

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30212**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech V Semester Supplementary Examinations May-2023

Course Name: POWER SYSTEM PROTECTION

(Electrical & Electronics Engineering)

Date: 13.05.2023 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

1.	Define restriking voltage.	2 M
2.	What is meant by current chopping?	2 M
3.	List the fundamental requirements of a relay.	2 M
4.	What is the principle of static relays?	2 M
5.	What are the difficulties experienced in differential protection of a Generator?	2 M
6.	What are the main elements of current-carrier protection?	2 M
7.	Why earth wire is provided in overhead transmission lines?	2 M
8.	Enumerate the factors causing arcing grounds.	2 M
9.	What are the internal causes for the over voltages in power system?	2 M
10.	List the various types of lightning arresters.	2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A).	Explain the construction and operation of low oil circuit breaker with neat diagram also lists its advantages and disadvantages.	10M
	OR	
11. B).	Design the value of resistance to be used across the contacts to eliminate the re-striking voltage and also calculate the voltage appearing across the pole of a CB if a magnetizing current of 10A is interrupted for a system of 132KV, 3-ϕ, 50 Hz, the circuit Phase to ground capacitance is 0.01μF, the inductance is 6H.	10M
12. A).	Explain the operation of a non-directional induction relay with neat sketch.	10M
	OR	
12. B).	Derive the operating conditions of various types of distance relays. Discuss operating characteristics of these relays.	10M
13. A).	What are the various faults that occur in the stator of generator and explain internal fault protection with a neat diagram?	10M
	OR	
13. B).	A 3-phase transformer rated for 33/6.6KV is star/delta connected and the protection current transformers on the low voltage side have a ratio of 400/5A. Design the ratios of CT's on the HV side, also draw the connection diagram?	10M

(P.T.O..)

14. A). Explain Solid neutral grounding and Reactance neutral grounding methods with neat diagram and also list its advantages and disadvantages. 10M

OR

14. B). A 50 Hz overhead line has line to earth capacitance of 1.2 μF. It is desired to use earth fault neutralizer. Determine the reactance to neutralize the capacitance of (i) 100% of the length of the line (ii) 90% of the length of the line and (iii) 80% of the length of the line. 10M

15. A). Discuss the basic ideas of insulation coordination in the practical power system. 10M

OR

15. B). Describe the construction and operation of a Zinc-Oxide lightning arrester with a neat diagram. List out its advantages and disadvantages. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30210**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech V Semester Supplementary Examinations May-2023
Course Name: POWER ELECTRONICS
(Electrical & Electronics Engineering)

Date: 16.05.2023 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

1. What are the differences between signal diode and power diode? 2 M
2. What are the SCR Commutation methods? 2 M
3. What are the advantages of semi controlled converter? 2 M
4. What do you mean by dual converter? And write the necessary condition is required? 2 M
5. What are the disadvantages of variable frequency control strategy? 2 M
6. Define step down chopper and write the relation between input voltage and output voltage. 2 M
7. Define Inverter and write its few applications. 2 M
8. What is single pulse modulation write the relation between output voltage the pulse width? 2 M
9. Draw the AC voltage controller circuit by using 4 diodes and an SCR. 2 M
10. What are the applications of cycloconverter? 2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Analyze the snubber circuits and derive the condition for R_s 10M

OR

11. B). Analyze the switching characteristics of Power IGBT with necessary diagrams 10M

12. A). Examine the effect of source inductance on the performance of a three phase fully controlled bridge converter with the relevant waveforms. 10M

OR

12. B). Interpret the expression for circulating current for 1-phase dual converter under on load condition with necessary circuit diagram and waveforms. 10M

13. A). Examine the operation of a Buck Chopper circuit with neat waveforms. 10M

OR

13. B). Examine the operation of a Boost Chopper circuit with neat waveforms. 10M

14. A). Elucidate single pulse modulation in inverter and derive necessary equations. 10M

OR

14. B). Infer the operation of three phase inverter operating with 180° mode conduction. Plot the necessary phase and line voltages. 10M

(P.T.O..)

15. A). Inspect single phase step down cycloconverter with resistive and inductive load and explain its operation. 10M

OR

15. B). For a single phase voltage controller feeding a RL load, Illuminate the wave forms of gating signals, output voltage, output current and voltage across each switch, Also expression for RMS load Voltage. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30213**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech V Semester Supplementary Examinations May-2023

Course Name: ELECTRICAL MEASUREMENTS

(Electrical & Electronics Engineering)

Date: 18.05.2023 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

1. List out the applications of DC potentiometers 2 M
2. Compare polar type and coordinate type of potentiometers. 2 M
3. What are the advantages of Wheatstone's bridge? 2 M
4. Write the advantages of loss of charge method. 2 M
5. Write the difference between the Desauty's bridge and schering bridge. 2 M
6. List the suitable ac bridges for the measurement of unknown inductance in terms of known capacitance. 2 M
7. What is use of ballistic tests in magnetic measurements? 2 M
8. Explain about the various methods of measurement of air gap flux. 2 M
9. What is the function of digital storage oscilloscope? 2 M
10. Draw the schematic diagram of DVM. Explain about auto ranging, polarity detection and auto zeroing. 2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Explain about the following applications of D.C. potentiometers. 10M
i) Calibration of voltmeter
ii) Measurement of resistance

OR

11. B). In the measurement of power by a polar potentiometer, the following readings were obtained: Voltage across a 0.2Ω standard resistance in series with the load=1.46∟32deg, Voltage across a 200:1 potential divider across the line=1.37∟56 degV. Estimate the current, voltage, power and power factor of the load. 10M

12. A). Explain the procedure with necessary expression to measure sensitivity of Wheatstone bridge. 10M

OR

12. B). A four terminal resistor of approximately 50 μΩ resistance was measured by means of a Kelvin bridge having the following component resistances: 10M
Standard resistor = 105Ω; Inner ratio arms = 105 Ω and 205 Ω; outer ratio arms = 103Ω and 200.5 Ω; resistance of link connecting the standard and the unknown resistance = 725 μΩ. Calculate the unknown resistance to the nearest 0.01 μΩ.

(P.T.O..)

13. A). A sheet of Bakelite 4.5 mm thick is tested at 50 Hz between electrodes 0.12 m in diameter. The Schering bridge employs a standard air capacitor C2 of 106 pF capacitance, a non-reactive resistance R4 of 1000Ω in parallel with a variable capacitor C4 = 0.5 μF, and a non-reactive variable resistance R3. Balance is obtained with C4=0.5μF and R2=260Ω. Calculate the capacitance, power factor and relative permittivity of sheet. 10M

OR

13. B). Explain about the bridge used to measure imperfect capacitors with necessary sketches and balance equations. 10M

14. A). Explain the procedure to measure leakage factor using flux meter with necessary sketches. 10M

OR

14. B). Explain about ballistic tests for the determination of magnetic flux density, magnetizing force, magnetic potentiometer, B-H curve and Hysteresis loop. 10M

15. A). Describe briefly the working principle of digital multimeter with the help of neat diagram. 10M

OR

15. B). Explain the operation of clap-on meter with necessary diagrams. 10M

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H.T No: | | | | | | | | | | | R18 Course Code: A30233

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech V Semester Supplementary Examinations May-2023
Course Name: ELECTRIC SMART GRID TECHNOLOGIES
(Electrical & Electronics Engineering)

Date: 20.05.2023 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

1. Descibe the meaning of Smart Grid. 2 M
2. List out the advanges of Smart Grid. 2 M
3. Define architecture. 2 M
4. What is Automation? 2 M
5. List the Componets of Smart Grid 2 M
6. Explain the need for Energy Storage Systems 2 M
7. Mention effects of vehicles on environment. 2 M
8. Listout the built-in performance measures of DSOPF. 2 M
9. Write online applications of PMUs. 2 M
10. What is Microgrid? 2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Describe the opportunities and challenges related to Smart Grid. 10M

OR

11. B). Differentiate between conventional grid and smart grid. 10M

12. A). What are the major points which are the forced to drive for demanding Smart Grid. 10M

OR

12. B). Write a short notes on Indian Smart Grid. 10M

13. A). Illustrate about Battery Energy Storage Systems. 10M

OR

13. B). Explain indetail about Hybrid Electric Vehicles. 10M

14. A). Write challenges of load flow in Smart Grid. Also, Mention weaknesses of present Load Flow Methods. 10M

OR

14. B). Explain DSOPF Application to the Smart grid with neat Diagram. 10M

15. A). Compare SCADA and PMUs and Mention applications of PMUs. 10M

OR

15. B). Write a short notes on Reactive Power Control in Smart Grids. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30232**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech V Semester Supplementary Examinations May-2023

Course Name: ELECTRICAL INSTRUMENTS

(Electrical & Electronics Engineering)

Date: 20.05.2023 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

1. List the type of pointers used in an instrument. 2 M
2. List the different procedures to extend the range of PMMC instruments. 2 M
3. Elaborate the precautions to use the instrument transformers. 2 M
4. Write the operating principle of dynamometer type instrument. 2 M
5. Give the deflecting and damping torque expressions. 2 M
6. Mention the measuring instruments to measure active power. 2 M
7. What is the different driving and deflecting torques in energy meter? 2 M
8. Explain the operating principle of maximum demand meter. 2 M
9. List some of the non-electrical transducers. 2 M
10. Plot the characteristics of electrical transducer. 2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Give details the construction and operating Principle of PMMC type instrument. 10M

OR

11. B). Elaborate the designing procedure of shunts and series resistance in instruments for extension. 10M

12. A). Brief about the Operation and working principle of MI type Power Factor meter. 10M

OR

12. B). With neat diagram mention the operation of Resonance type meters. 10M

13. A). Explain the operation of Dynamometer (LPF and UPF) wattmeter. 10M

OR

13. B). Write the procedure to extend the range of wattmeter using instrument transformer. 10M

14. A). Explain the operation of Tri-vector and maximum demand meters. 10M

OR

14. B). How to test by phantom loading energy meter using R.S.S Meter. 10M

15. A). Mention the necessity of differential transformer in an LVDT, and also explain the advantages of LVDT in linear displacement. 10M

OR

15. B). Elaborate the construction and operating principle of Thermo-couples and Thermistor. 10M

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