CSM : 22

ELECTRICAL ENGINEERING
PAPER - II

Time Allowed : 3 hours   Full Marks : 100

Marks for each question is indicated against it.
Attempt <u>any 5 (five)</u> questions taking not more than 3 (three) questions from each Part.

PART - A

1. (a) Describe gate-triggering of a thyristors. Does the gate-triggering has any effect on forward breakdown voltage? Discuss. **(8)**

    (b) What is UPS? Describe no break static UPS configuration. **(5)**

    (c) A three phase full converter charges a battery from a three phase supply of 230 V, 50 Hz source. The battery emf is 200 V and its internal resistance is $0.5\,\Omega$. On account of inductance connected in series with the battery, charging current is constant at 20 A. Compute the firing angle delay and the supply power factor. **(7)**

2. (a) Explain the instruction SIM and RIM in 8085 microprocessor. **(6)**

    (b) Briefly explain the different types of addressing mode in 8051 microcontroller with examples. **(6)**

    (c) Design memory system for the 8085 microprocessor such that it should contain 8Kbyte of EPROM and 8Kbyte of RAM. Also draw the memory map of the system. **(8)**

3. (a) The current in an antenna of an AM transmitter is 8.0A when only the carrier is sent, but it increases to 9.0A, when the carrier is sinusoidally modulated. Find the percentage modulation. Determine also the antenna current when the depth of modulation is 0.77. **(7)**

    (b) A sinusoidal modulating wave of amplitude 5V and frequency 1kHz is applied to a frequency modulator. The frequency carrier frequency is 100 kHz. Calculate: (i) frequency deviation, (ii) modulation deviation and (iii) instantaneous of the FM wave. Also write the expression of the FM wave. **(13)**

4. (a) What are optical fibres? What are the advantages of optical fibre as compared to coaxial cable and waveguides? **(6)**

    (b) Write a comparison between fibre optic cable and copper cable. Write different applications of fibre optic cable. **(14)**

PART - B

5. (a) Explain the principle and application of wind electric system. State the basic Components and their working in wind electric system. **(12)**

   (b) What is the principle of solar photovoltaic power generation? What are the main elements of a PV system? **(8)**

6. (a) Describe the construction and operating principle of vacuum circuit breaker. What are its advantages over conventional type circuit breakers? **(7)**

   (b) Briefly describe miniature circuit breaker (MCB) and moulded case circuit breaker (MCCB). **(8)**

   (c) For a 132 kV system, the reactance and capacitance up to the location of the circuit breaker is 3 ohms and 0.015 μF respectively. Calculate the frequency of transient oscillation and the maximum value of RRRV. **(5)**

7. (a) Differentiate between steady state stability and transient stability of a power system. Discuss the factors that affect (i) steady state stability, and (ii) transient state stability of the system. **(6)**

   (b) A 500 MVA, 20 kV, 50 Hz, four-pole synchronous generator is connected to an infinite bus through a purely inductive network. The generator has an inertia constant $H = 6.0$ MJ/MVA and is delivering power of 1.0 p.u. to the infinite bus at steady-state. The maximum power that can be delivered is 2.5 p.u. A fault occurs that reduces the generator output power to zero. (i) Find the angular acceleration, (ii) Find the speed in rpm at the end of 15 cycles, and (iii) Find the change in angle d at the end of 15 cycles. **(14)**

8. (a) Compute the DFT of a sequence $(-1)^n$ for $N = 4$ **(6)**

   (b) Determine the impulse response of the system described by difference equation $y(n) = y(n-1) - 0.5y(n-2) + x(n) + x(n-1)$. Plot the pole zero pattern and discuss on stability. **(14)**

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