SIE

2010 200042

ELECTRICAL ENGINEERING - II (Optional)

Standard : Degree **Total Marks : 200**

Nature : Conventional **Duration : 3 Hours**

Note :

(i) *Answers must be written in* ***English.***

(ii) *Question* ***No. 1*** *is* ***Compulsory****. Of the remaining questions, attempt* ***any four*** *selecting one question from* ***each*** *section.*

(iii) *Figures to the* ***RIGHT*** *indicate marks of the respective question.*

(iv) *Use of log table, Non-programmable calculator is permitted, but any other Table/Code/ Reference book are not permitted.*

(v) *Make suitable assumptions, wherever be necessary and state the same.*

(vi) *Number of optional questions up to the prescribed number in the order in which they have been solved will only be assessed. Excess answers will not be assessed.*

(vii) *Credit will be given for orderly, concise and effective writing.*

(viii) *Candidate should not write roll number, any name (including their own), signature, address or any indication of their identity anywhere inside the answer book otherwise he/she will be penalised.*

1. Answer ***any four*** of the following :

(a) For an SCR gate cathode characteristic is given by $Vg = 1 + 10\ Ig$. Gate source voltage is a rectangular pulse of 15V with 20μsec duration. For an average gate power dissipation of 0.3 W and a peak gate drive power of 5 W. **10**

Compute :

(i) the resistance to be conducted.

(ii) the triggering frequency.

(b) With reference to pulse code modulation, calculate the number of levels if the number of bits per sample is : **10**

(i) 8 (as in telephony).

(ii) 16 (as in compact disc audio systems).

(c) Find DFT of $x(n) = [1, 2, 3, 4, 4, 3, 2, 1]$ using DIT - FFT alogarithm. **10**

(d) Write on the power scenario of India ingeneral and Maharashtra in particular. **10**

(e) What are the salient features of electricity act - 2003 ? **10**

P.T.O.

Marks

SECTION - A

2. Answer the following sub - questions :

(a) (i) Draw characteristics of IGBT. **5**

(ii) State addressing modes of 8085. **5**

(b) A dc chopper is used for regenerative braking of a separately excited dc motor. The supply voltage is 400 V. The motor has *ra* 0.2 Ω, *km* 1.2 *v-s/rad.* The average armature current during regenerative breaking is kept constant at 300 A with negligible ripple. For duty cycle of 60%. **15**

Determine (i) power returned to dc supply.

(ii) min & max permissible breaking speeds.

(iii) speed during braking.

(c) Write a program in 8051 to find the maximum number from given ten. 8 bit numbers. **15**

3. Answer the following sub questions :

(a) (i) State turn on methods of thyristors. **5**

(ii) State type of interrupts of 8085. **5**

(b) Explain operation of 3 phase bridge inverter operating in 120° mode. **15**

(c) State important features of 8051 family. **15**

SECTION - B

4. Answer the following sub-questions :

(a) Draw the block diagram ob basic communication system and explain its various elements. Also explain by drawing simple wave form the difference between AM and FM system. **15**

(b) State and explain various advantages offered by optical fibre communication. **15**

(c) State the comparison of the characteristic laser light and ordinary light. **10**

5. Answer the following sub questions :

(a) Explain following modulation technique. **15**

(i) Pulse frequency modulation.

(ii) Pulse time modulation.

(iii) Pulse position modulation.

(b) Draw Block diagram of delta modulation transmitter, receiver and corresponding wave form, at input and output. **15**

(c) Discuss various optical properties of optical fibre material. **10**

Marks

SECTION - C

6. (a) Find the impulse response of the system modeled by the differential equation - **10**

To $\frac{dy(t)}{dt} + y(t) = x(t) \quad -\infty < t < \infty$

(b) Evaluate the Fourier transform of the system whose unit sample response is - **10**

$h(n) = 1 \quad \text{for } 0 \le n \le N-1$

$= 0 \quad \text{elsewhere}$

(c) Find the input signal $x(n)$ that will generate the output signal $y(n) = \{1, 5, 10, 11, 8, 4, 1\}$ for a system with impulse response $h(n) = \{1, 2, 1\}$. **10**

(d) Find a forced response of the system described by the difference equation - **10**

$y(n) + 2y\ (n-1) + y(n-2) = x(n) + x(n-1)$

for the input -

$x(n) = (\frac{1}{2})^n\ u(n)$.

7. (a) (i) Check that the system is causal or not. If - **5**

$$y(n) = \frac{1}{2}\left[x(n-1) + \frac{x(n)}{x(n-1)}\right]$$

(ii) Explain Gibb's phenomenon. **5**

(b) The step response of a LTI system is - **10**

$s(n) = \left[\frac{1}{3}\right]^{n-1} u(n+2)$ find system function H(z)

(c) Design a Chebyshev filter with maximum pass band of 2.5 dB, at $\Omega_p = 20$ rad/sec and the stop band attenuation of 30 dB at $\Omega s = 50$ rad/sec. **10**

(d) (i) The filter co-efficient $H = -0.673$ is represented by sign magnitude fixed point arithmetic. If word length is 6 bit, compute the quantization error due to truncation. **5**

(ii) Write a note on high speed convolution. **5**

Marks

SECTION - D

8. (a) State the primary energy sources available in India & discuss their potentialities. Also explain the future trends in energy developments in India. **15**

   (b) A Synchronous motor draws power from a synchronous generator having $Eg = 1.2 \angle 9°$ and $Em = 0.95 \angle -21°$. The transfer reactance between them Xgm=1.3 pu. Discuss the possible ways by which the maximum power limit can be increased beyond 1.0 *pu* **15**

   (c) Enumerate the simplifying assumptions made for stability analysis of a two machine systems and derive the swing equation. **10**

9. (a) (i) Draw the basic schematic diagram of a typical wind mill and explain energy conversion. **8**

   (ii) What are the power quality issues related to solar energy. **7**

   (b) Consider the incremental model for an unregulated synchronous machine and prove that the system is unstable, if either synchronizing power coefficient or synchronous damping is -ve. **15**

   (c) What are the power system stabilizer and write in brief on their use. **10**

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