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**T.Y. B.Tech. (E & TC) (Part - III) (Semester - V) (CBCS)**  
**Examination, January - 2023**  
**SIGNALS AND SYSTEM**  
**Sub. Code : 80807**

Day and Date : Friday, 13 - 01 - 2023

Total Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

- Instructions :
- 1) All Question are compulsory.
  - 2) Assume suitable data wherever necessary.
  - 3) Figures to the right indicate full marks.

Q1) Solve the objective type question.

[14]

- a) A system represented by equation  $y(t) = tx(t)$  is \_\_\_\_\_
- i) Linear system
  - ii) Non-linear system
  - iii) Neither linear nor non-linear system
  - iv) None of these
- b) Which among the following operations is not involved with the linear convolution of discrete time signal?
- i) Folding Operation
  - ii) Shifting Operation
  - iii) Multiplication Operation
  - iv) Integration Operation
- c) The distributive property of convolution is \_\_\_\_\_
- i)  $x(t)*h(t)=h(t)*x(t)$
  - ii)  $x(t)*[h_1(t)*h_2(t)]=[x(t)*h_1(t)]*h_2(t)$
  - iii)  $x(t)*[h_1(t)+h_2(t)]=[x(t)*h_1(t)]+[x(t)*h_2(t)]$
  - iv) None of the above

P.T.O.

- d) A signal  $x(t)$  can be transformed to  $x(at)$  by using which of the below operation?
- i) Time reversal
  - ii) Time shifting
  - iii) Time scaling
  - iv) All of the above
- e) The Fourier transform of a unit step function is given as
- i)  $F(j\omega) = 1/j\omega$
  - ii)  $F(j\omega) = j\omega$
  - iii)  $F(j\omega) = j/\omega$
  - iv)  $F(j\omega) = \omega/j$
- f) What is DTFT of sequence give  $x(n) = a^n u(n)$
- i)  $\frac{1}{1 - ae^{-j\omega}}$
  - ii)  $\frac{1}{1 - ae^{j\omega}}$
  - iii)  $\frac{1}{1 + ae^{-j\omega}}$
  - iv)  $\frac{1}{1 + ae^{j\omega}}$
- g) What is the z-transform of the following finite duration signal?
- $x(n) = \{2, 4, 5, 7, 0, 1\}$
- ↑
- i)  $2 + 4z + 5z^2 + 7z^3 + z^4$
  - ii)  $2 + 4z + 5z^2 + 7z^3 + z^5$
  - iii)  $2 + 4z^{-1} + 5z^{-2} + 7z^{-3} + z^{-5}$
  - iv)  $2z^2 + 4z + 5 + 7z^{-1} + z^{-3}$

Q2) Solve Any two

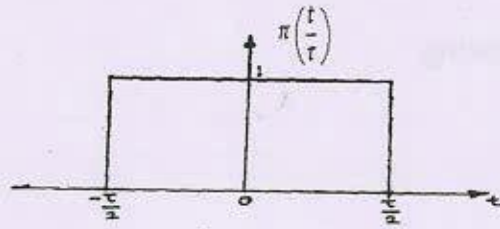
[14]

- a) Explain Classification of Signals.
- b) Find convolution of two sequences.

$$X[n] = \begin{cases} 1 & \text{for } 0 \leq n \leq 4 \\ 0 & \text{Elsewhere} \end{cases}$$

$$Y[n] = \begin{cases} 2^n & \text{for } 0 \leq n \leq 6 \\ 0 & \text{Elsewhere} \end{cases}$$

- c) Find the Fourier Transform of the Gate function.



**Q3) Solve any two**

**[14]**

- a) Determine even and odd part of following signals

i)  $x[n] = \{-1, -1, -1, 1, 1, 1, 1\}$

ii)  $x(t) = -2t \quad t < 0$   
 $= t \quad t > 0$

- b) Convolve the sequences  $x(n) : \{2, 3, 1, 4\}$  and  $h(n) = \{-1, 2, 3\}$  using graphical method

- c) Explain properties of Fourier Transform

**Q4) Solve any two**

**[14]**

- a) Find DTFT of following

i)  $x(n) = a^n u(n)$

ii)  $x(n) = 2^n \quad \text{for } -2 \leq n \leq 2$   
 $= 0 \quad \text{otherwise}$

- b) Find Z Transform of following

i)  $x(n) = \left(\frac{1}{2}\right)^n u(-n)$

- c) Develop direct form I and II realization of difference equation.

i)  $y(n) = b_0 x(n) + b_1 x(n-1) + b_2 x(n-2) + b_3 x(n-3) - a_1 y(n-1) - a_2 y(n-2) - a_3 y(n-3)$

Q5) Solve Any two

a) Find 4 point DFT of following

$$\text{i) } x(n) = \{-1, 2, 5, 4\}$$

↑

$$\text{ii) } x(n) = \sin\left(\frac{\pi n}{2}\right)$$

b) Find inverse Z transform using Long Division Method

$$\text{i) } \frac{1}{1+3z^{-1}+2z^{-2}} \text{ ROC } |z| > 2$$

c) Find inverse Z transform using Partial Fraction Method

$$\text{i) } \frac{8z-9}{z^2+5z-6} \text{ ROC } |z| > 3$$

**\*\*\***



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[2×7=14]

Q4) Solve any two

- Explain edge emitting LED.
- Write note on light source linearity.
- Give comparison of various photodetectors.

Q5) Solve any two

[2×7=14]

- Explain 2×2 waveguide coupler.
- Explain in detail transmission formats and speeds in SONET?
- Write note on Tunable filters, tunable sources.

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**T.Y.B Tech. (E&TC) (Semester - V) (CBCS)**  
**Examination, January - 2023**  
**PCC-ETC-504 : OPTICAL COMMUNICATION**  
**Sub. Code : 80810**

Day and Date : Tuesday, 24 - 01 - 2023

Total Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

- Instructions :
- All questions are compulsory.
  - Figure to the right indicate full marks.
  - Assume suitable data if necessary.

Q1) All questions are compulsory.

[14]

- The light sources used in fiber optics communication are \_\_\_\_\_
  - LED's and Lasers
  - Phototransistors
  - Xenon lights
  - Incandescent
- What is the numerical aperture of the fiber if the angle of acceptance is 16 degree?
  - 0.50
  - 0.36
  - 0.20
  - 0.27
- A multimode step index fiber has a normalized frequency of 72. Estimate the number of guided modes.
  - 2846
  - 2592
  - 2432
  - 2136
- Skew rays follow a \_\_\_\_\_
  - Hyperbolic path along the axis
  - Parabolic path along the axis
  - Helical path
  - Path where rays changes angles at core-cladding interface



- e) A decibel may be defined as the ratio of input and output optical power for a particular optical wavelength
- i) True                      ii) False
- f) The effects of intrinsic absorption can be minimized by \_\_\_\_\_
- i) Ionization  
ii) Radiation  
iii) Suitable choice of core and cladding components  
iv) Melting
- g) Dominant intrinsic loss mechanism in low absorption window between ultraviolet and infrared absorption tails is \_\_\_\_\_
- i) Mie scattering                      ii) Rayleigh scattering  
iii) Stimulated Raman scattering    iv) Stimulated Brillouin scattering
- h) Mie scattering has in-homogeneities mainly in \_\_\_\_\_
- i) Forward direction                      ii) Backward direction  
iii) All direction                      iv) Core-cladding interface
- i) What does ISI stand for in optical fiber communication?
- i) Invisible size interference                      ii) Infrared size interference  
iii) Inter-symbol interference                      iv) Inter-shape interference
- j) Practical pulse broadening value for graded index fiber lies in the range of \_\_\_\_\_
- i) 0.9 to 1.2 ns/km                      ii) 0.2 to 1 ns/km  
iii) 0.23 to 5 ns/km                      iv) 0.45 to 8 ns/km

- k) The modal noise can be reduced by \_\_\_\_\_
- i) Decreasing width of signal longitudinal mode  
ii) increasing coherence time  
iii) Decreasing number of longitudinal modes  
iv) Using fiber with large numerical aperture
- l) Optical fibers for communication use are mostly fabricated from \_\_\_\_\_
- i) Plastic                      ii) silica or multicomponent glass  
iii) Ceramics                      iv) Copper
- m) The recombination in indirect band-gap semiconductors is slow
- i) True                      ii) False
- n) A particular laser structure is designed so that the active region extends the edges of devices.
- i) True                      ii) False

## Q2) Solve any two

[2×7=14]

- a) Write down the definition of critical and acceptance angle and explain acceptance cone.
- b) With the help of neat diagram explain step index and graded index glass fiber? Give their comparison.
- c) Explain different indoor and outdoor fiber optic cables

## Q3) Solve any two

[2×7=14]

- a) Explain in detail bending losses in optical fiber.
- b) Explain polarization mode dispersion.
- c) Explain in detail with block diagram the nonlinear effects in optical fiber.

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**T.Y.B.Tech. (Electronic and Telecommunication Engineering)**  
**(Semester- V) Examination, January - 2023**  
**DIGITAL AND VLSI DESIGN**  
**Sub. Code : 80809**

Day and Date : Saturday, 21 - 01 - 2023  
Time : 10.30 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :
- 1) All questions are compulsory.
  - 2) Use suitable assumptions if required.
  - 3) Draw necessary figures on right side of answer sheet.

Q1) All questions are compulsory.

[7×2=14]

- a) The operator '&' is called the \_\_\_\_\_ operator.
  - i) Logical AND operator
  - ii) Bitwise AND operator
  - iii) Arithmetic addition operator
  - iv) Concatenation operator
- b) Which of the following statement can't be used inside a process?
  - i) WAIT
  - ii) IF ELSE
  - iii) Variable declaration
  - iv) PORT MAP
- c) Process is a \_\_\_\_\_ statement.
  - i) Concurrent
  - ii) Sequential
  - iii) Delay
  - iv) Both concurrent and sequential
- d) How many flip flops are necessary to design a state machine with 25 states?
  - i) 2
  - ii) 5
  - iii) 25
  - iv) 32

P.T.O.



- e) Refer to the VHDL code given below, which is the legal assignment statement?

SIGNAL x : SRD\_LOGIC;

SIGNAL y : STD\_LOGIC\_VECTOR (3 DOWNT0 0);

- i)  $y \leq (1 \Rightarrow '1', \text{OTHERS} \Rightarrow '0');$
  - ii)  $y := "0100";$
  - iii)  $y \Rightarrow "0100";$
  - iv)  $y \Rightarrow x;$
- f) Which of the following is more volatile?
- i) SRAM
  - ii) DRAM
  - iii) ROM
  - iv) RAM
- g) PLA is used to implement\_\_\_\_\_
- i) A complex sequential circuit
  - ii) A simple sequential circuit
  - iii) A complex combinational circuit
  - iv) A simple combinational circuit

Q2) Solve any two.

[2×7=14]

- a) Find out by using Quine Mc-Cluskey Minimization technique,  
 $F(A, B, C, D) = \sum m(0, 5, 8, 9, 10, 11, 14, 15).$
- b) Write a VHDL program for full Adder?
- c) Explain need of VHDL

Q3) Solve any two.

[2×7=14]

- a) Write a VHDL program for BCD to Excess-3 Code
- b) Write VHDL program for 2:4 Decoder
- c) Short in short 4 bit ALU

[2×7=14]

Q4) Solve any two.

- a) Write a VHDL program for T Latch
- b) Write short note on DRAM/NVRAM
- c) Explain & convert SR to D flip flop

Q5) Solve any two.

[2×7=14]

- a) What is FSM?
- b) Write a VHDL code for Mealy Machine
- c) Explain in detail PLA





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**T.Y. B.Tech. (E & TC) (Part - II) (Semester - IV) (CBCS)**  
**Examination, January - 2023**  
**PCC-ETC503 : ELECTROMAGNETIC ENGINEERING**  
**Sub. Code : 80808**

Day and Date : Thursday, 19 - 01 - 2023

Total Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

- Instructions :
- 1) All questions are Compulsory.
  - 2) Figure to the right indicates full Marks.
  - 3) Assume Suitable data if necessary.

**Q1) Solve the all Questions (Rewrite the statement by correct option) [14]**

- a) According to Biot- Savart's law, which parameter is inversely proportional to the differential magnetic field intensity (dH)?
  - i) current
  - ii) magnitude of differential length
  - iii) sine of angle between filament & line connecting differential length to point
  - iv) square of the distance from differential element to point
- b) Electromagnetic waves travelling in a medium having relative permeability  $\mu_r = 1.3$  and relative permittivity  $\epsilon_r = 2.14$ . The speed of electromagnetic waves in medium must be
 

i) $1.8 \times 10^8 \text{ ms}^{-1}$	ii) $1.8 \times 10^4 \text{ ms}^{-1}$
iii) $1.8 \times 10^6 \text{ ms}^{-1}$	iv) $1.8 \times 10^2 \text{ ms}^{-1}$
- c) The Cartesian system is also called as
 

i) Circular coordinate system	ii) Rectangular coordinate system
iii) Spherical coordinate system	iv) Space coordinate system

**P.T.O.**

- Q2) Solve any two

- [14]

Q3) Solve any two

- Q4) Solve any two**

- [14]

[14]

- x x x