

Seat
No.

SE -162

Total No. of Pages : 3

T.E. (Electronics) (Semester -V) Examination, November - 2018

SIGNALS AND SYSTEMS

Sub. Code : 66280

Day and Date : Monday, 19- 11 - 2018

Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

- Instructions :
- 1) All questions are compulsory.
 - 2) Figure to the right indicate full marks.
 - 3) Assume necessary data wherever required.

SECTION - I

Q1) Solve any two

[16]

- a) A signal $x[n]$ is given below. Sketch and label each of the following

$$x[n] = [-1, -1, 0, 1, 1]$$



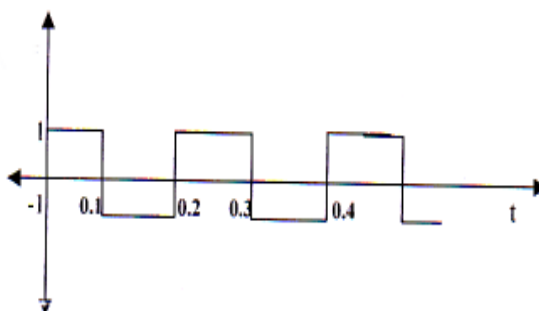
- i) $x[2n + 3]$
 - ii) $x[n - 4]$
 - iii) $x[2 + n/3]$
 - iv) $x[n] + x[-n]$
- b) Determine whether the following systems are linear/nonlinear, Causal/noncausal. Justify your answer.

i) $y(t) = x(t + 1) + x(t^2)$

ii) $y[n] = x[n] + \frac{1}{x[n+1]}$

- c) Determine whether the following signals are energy signal, power signal or neither of two.

i) $x(t) =$



ii) $x[n] = \cos[\pi n]$ for $-4 \leq n \leq 4$
 $= 0$ otherwise

P.T.O.

Q2) Solve any two

a) Draw even and odd parts of following signals

$$\begin{aligned} \text{i)} \quad x(t) &= t \text{ for } 0 \leq t \leq 1 \\ &= 2 - t \text{ for } 1 \leq t \leq 2 \\ &= 0 \quad \text{otherwise} \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad x[n] &= 1 \text{ for } -1 \leq n \leq 2 \\ &= 0 \quad \text{otherwise} \end{aligned}$$

b) Find the convolution sum of the following signals and plot resultant sketch $x[n] = [1, 2, 3, 2, 1]$, $h[n] = [2, 2, 2]$ by analytical method.

c) Determine whether the following systems are linear/nonlinear, stable/unstable. Justify your answer.

$$\text{i)} \quad y(t) = e^{-2x(t)}$$

$$\text{ii)} \quad y[n] = x[n] + nx[n+1]$$

Q3) Solve any three.

[18]

a) State and explain convolution properties for both C.T. and D.T.

b) Determine whether the following signals are periodic or nonperiodic. If periodic find fundamental period.

$$\text{i)} \quad x(t) = \cos(t) + \sin(\sqrt{2}t)$$

$$\text{ii)} \quad x[n] = \cos\left[\frac{\pi n}{4}\right] - \sin\left[\frac{\pi n}{2}\right]$$

c) What is Interpolation? What are its methods? Explain zero order Hold method.

d) Consider the following signal

$$x(t) = \cos(2,000\pi t) + 10\sin(10,000\pi t) + 20\cos(5,000\pi t)$$

Determine:

i) Nyquist sampling rate

ii) If sampling rate is 5,000 samples per sec. then what is the discrete time signal obtained after sampling.

SECTION - II

Q4) Attempt any two [18]

a) Find the Fourier transform of the following.

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

ii) $x(n) = (0.5)^n u(n) + 2^{-n} u(-n-1)$

b) Find the 4 point DFT of the sequence.

$$n(n) = \{0, 1, 0, -1\}$$

c) Find the IDFT of the following

$$\mathbf{X}(\mathbf{K}) = \{1, 0, 1, 0\}$$

Q5) Attempt any two **[16]**

a) Using long division, determine the inverse Z transform of

$$X(Z) = \frac{Z+1}{Z^2-3Z+2}.$$

b) Determine the signal $x(n]$ whose Z transform is given by

$$X(Z) = \log(1 - aZ^{-1}); |Z| > |a|.$$

c) Find Z transform of the following.

i) $x(n) = \{1, 2, -1, 2, 3\}$

ii) $x(n) = \{1, 2, -1, 3, 2, 1\}$

Q6) Attempt any two **[16]**

a) Explain in detail any four properties of Z transform.

b) Find the direct form - I Realization of a discrete time system represented

by transfer function $H(z) = \frac{2z^3 - 4z^2 + 11z - 8}{(z - 8)(z^2 - z + 3)}$

c) Find the digital network in direct form II for the system described by the difference equation.

$$y(n) = x(n) + 0.3x(n-1) - 0.4x(n-2) - 0.8y(n-1) + 0.7y(n-2)$$



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**B.E. (Mechanical) (Part - IV) (Semester - VIII) Examination,
November - 2018**

NOISE AND VIBRATION

Sub. Code : 68510

Day and Date : Wednesday, 14 - 11 - 2018

Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Use of scientific calculator is allowed.
 - 3) Assume suitable data wherever necessary and mention it clearly.

Q1) Solve any two of the following :

- a) Show that equivalent mass of simple spring mass system subjected to free vibration is summation of main mass and one third of mass of the spring. [8]
- b) Find the natural frequency of the system shown in Fig. No.1. Take $G = 8.4 \times 10^{10} \text{ N/m}^2$. In order to get natural frequency 50 Hz, what must be shaft diameter? [8]

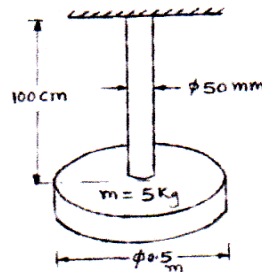


Figure No. 1

- c) Figure No.2 shows a pulley of mass M pivoted at its centre. Mass 'm' vibrates with small amplitude from its mean position. Find the natural frequency of the system in terms of given parameters. [8]

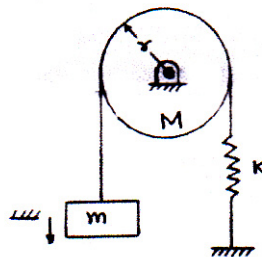


Figure No.2

P.T.O.

- Q2) a)** Show that the reduction in vibration amplitude after one complete cycle of single degree free vibration with friction damping is $4F/k$, where F = frictional force between mass and surface and k = stiffness of the system. [8]
- b)** In a spring, mass, friction damper system it has been observed that the amplitude of vibration decreases by 75% of initial value of 10 cm after 5 consecutive cycles. determine friction coefficient of friction damper if stiffness of the spring is 2000N/m and mass is 5 kg. [8]

OR

- b)** Spring-mass-damper system is having a mass of 10 kg and a spring of such stiffness which causes static deflection of 5mm. The amplitude of vibration reduces by 75% to that of initial value in 10 cycles. Determine logarithmic decrement, damping present in the system and damped natural frequency. [8]

- Q3) a)** Show that the magnification factor of spring-mass-damper system subjected to harmonic exciting force $F_0 \cos \omega t$ is given by- [9]

$$M.F = \frac{1}{\sqrt{\left[1 - \left(\frac{\omega}{\omega_n}\right)^2\right]^2 + \left(\frac{2\zeta\omega}{\omega_n}\right)^2}}$$

- b)** A mass of 6kg is suspended by a spring of stiffness 1200N/m is forced to vibrate by a harmonic force of 9N. Assuming viscous damping coefficient $c = 70 \text{ N-s/m}$ determine amplitude at resonance, frequency corresponding to peak amplitude peak amplitude. What would be the phase angle at resonance? [8]

OR

- b)** Determine natural frequencies and mode shape of the system shown in Figure No.3. [8]

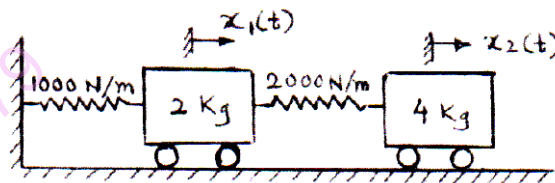


Figure No. 3

- Q4) a)** What is vibration absorber? What principal is used in dynamic vibration absorber? [8]

OR

Describe Holzer's method used to determine the natural frequencies of three rotor system. [8]

- b) By using matrix iteration method determine first natural frequency and corresponding mode shape of the following system (Figure No.4) [9]

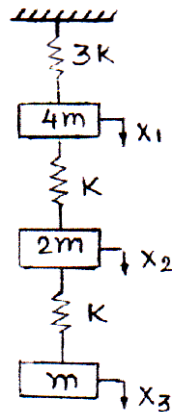


Figure no.4

- Q5) a)** What are the steps involved in vibration condition monitoring? How the vibration monitoring helps to carry out preventive maintenance of rotating machines. [8]

- b) What is FFT analyzer? What facilities are available in modern FFT analyzer. [8]

- Q6) a)** What is decibel scale? What is its importance? How are the incoherent sound pressure levels added? [9]

- b) What is octave and 1/3rd octave band analysis? What is use of this analysis in noise control? [9]

OR

- b) Show that if distance from a point source doubled, the sound intensity level decreases by 6dB. [9]

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**T.E. (Electronics) (Semester - V) Examination,
November - 2018**

ELECTROMAGNETIC ENGINEERING

Sub. Code : 66282

Day and Date : Monday, 26 - 11 - 2018

Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figure to the right indicates full marks.
 - 3) Assume suitable data if necessary.
 - 4) Use of nonprogrammable calculator is allowed.

SECTION - I

Q1) Attempt Any Two.

[16]

- A) Give three points A(2, -3, 1), B(-4, -2, 6) and C(1, 5, -3), find:
- i) The vector from A to C.
 - ii) The unit vector from B to A.
 - iii) The distance from B to C.
 - iv) The vector from A to the midpoint of the straight line joining B to C.
 - v) Calculate the length of the perimeter of triangle ABC.
- B) Find the expression for electric field intensity due to a sheet of charge with uniform surface charge density ρ_s C/m² on an infinite plane.
- C) Evaluate both sides of Stokes theorem for the field :

$$\vec{H} = \left(\frac{y^2 z}{x} \right) \vec{a}_x + \left(\frac{0.5 y^2 z^2}{x^2} \right) \vec{a}_z$$

And find the current in the \vec{a}_y direction crossing the square surface in the plane $y = 2$ bounded by $x = z = 1$ and $x = z = 2$.

Q2) Attempt Any Two.

[16]

- A) Express in Cartesian components (a) the vector G extending from the origin to the midpoint of the line joining A(2, -3, 5) to B(6, -5, 5); (b) the vector D extending from C(-2, 7, 3) to the midpoint of the line joining A to B; (c) the components of R_{AB} that is in the direction of R_{AC} ; (d) a unit vector in the direction of R_{BC} .
- B) Obtain the boundary conditions involving tangential components and normal components for electrostatic field.

P.T.O.

- C) From Biot Savart laws derive the expression for magnetic field intensity \vec{H} due to infinitely long straight filament carrying current of I ampere.

Q3) Attempt Any Three.

[18]

- A) Given fields $G_1 = 5(x + y)a_x + 10a_y$ and $G_2 = 5a_x + 2xya_y$, find at $P(3, 2, 0)$; (a) $|G_1|$; (b) $|G_2|$; (c) a_1 a unit vector in the direction of G_1 ; (d) a_2 a unit vector in the direction of G_2 ; (e) a_{12} a unit vector in the direction of $(G_1 + G_2)$
- B) Obtain the expression for electric scalar potential V due to point charge Q i.e. prove that $V = Q/4\pi \epsilon_0 R$ (volts).
- C) Obtain the expression for energy stored in magnetic field.
- D) Find the Flux density at a point A(6,4,-5) caused by :
- A point charge of 20 mC at the origin.
 - A uniform line charge $\rho_l = 20 \mu C/m$ on the z axis.
 - A uniform charge density $\rho_s = 60 \mu C/m^2$ at plane $x = 8$.

SECTION - II

Q4) Solve any Two.

[16]

- A) A transmission line has the following constants: $R = 15\Omega/m$, $L = 5 \times 10^{-7} H/m$, $C = 4 \times 10^{-11} F/m$, $G = 0.2 \times 10^{-3} mho/m$ operated at 6 MHz frequency. Find the propagation constant, characteristic impedance and velocity of propagation.
- B) A 100-MHz uniform plane wave propagates in a lossless medium for which $\epsilon_r = 5$ and $\mu_r = 1$. Find : V_p , β , λ and η .
- C) Give Maxwell's equations for time varying field.

Q5) Solve any Two.

[16]

- A) What is inconsistency of amperes law? Explain
- B) How smith chart is used for the analysis of transmission line? Explain
- C) A plane electromagnetic wave having frequency of 1.0 GHz is traveling in an unbounded lossless dielectric having μ_r and ϵ_r as 1.0 and 5 respectively. Find the phase velocity V_p , the phase shift constant β and the intrinsic impedance of the medium.

Q6) Solve any Three.

[18]

- A) Polarization
- B) Double stub matching
- C) Circuit applications of pointing vector
- D) Faraday's law



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T.E. (Electronics) (Semester - V) (Revised) Examination,**November - 2018****VLSI DESIGN****Sub. Code : 66283****Day and Date : Wednesday, 28 - 11 - 2018****Total Marks : 100****Time : 10.00 a.m. to 01.00 p.m.**

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figures to right indicate full marks.
 - 3) Assume suitable data if required.

Q1) Attempt any three. [18]

- a) Explain features of VHDL
- b) Explain elements of VHDL
- c) Explain with suitable example relational, logical and shift operators.
- d) Write VHDL code for negative edge triggered D-FF with asynchronous reset.

Q2) Attempt any two. [16]

- a) Write VHDL code for 4-bit full adder using structural modeling.
- b) Write VHDL code for 4-bit parity generator
- c) Write VHDL code for 8-bit ALU with 8- functions.

Q3) Attempt any two. [16]

- a) Write VHDL code for BCD counter.
- b) Write VHDL code for LFSR. Show the circuit diagram.
- c) Explain following terms with suitable example.
 - i) Clock jitter
 - ii) Clock skew. How these can overcome?

P.T.O.

Q4) Attempt any three.

[18]

- What are different types of hazards? Explain with neat diagram.
- With suitable examples explain value kind and signal kind attributes.
- Describe event based and cycle based simulation process.
- Write VHDL statements for following logical statements,

$D = A.B$

$E = \text{not } D$

$F = E \text{ or } C$

Draw logical diagram and their waveforms, where each gate is having delay of 5ns.

Q5) Attempt any two.

[16]

- Describe the microprocessor circuit using general datapath. Show required control signals and generate control words.
- Implement the datapath to execute the following statements.
 $B = 8$ when $A > 7$ &
 $B = 13$ when $A < 7$
 Generate control words for this Datapath.
- Describe with neat diagram scan path technique for testing of sequential circuits.

Q6) Attempt any two.

[16]

- Explain in detail BIST circuit used in testing of sequential circuits. Show detailed diagram.
- Explain with neat circuit diagram working of PRBS generator.
 Write VHDL code for PRBS generator.
- Explain with neat diagram input - output block diagram of CPLD.



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T.E. (Electronics) (Semester - V) Examination,
November - 2018
DIGITAL COMMUNICATION (Revised)
Sub. Code : 66284

Day and Date : Friday, 30 - 11 - 2018

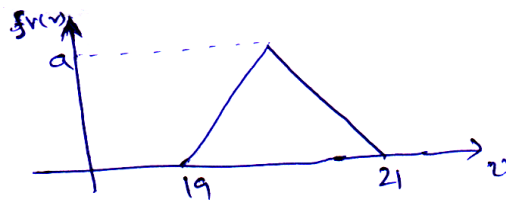
Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

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

Q1) Solve any two **[18]**

- a) If a number is selected at random, from all the four digit numbers formed by using 1,2,3,4 without repetition, find the probability for the selected number.
 - i) to be divided by 5
 - ii) to be an even number
 - iii) to be an odd number
- b) What is an ergodic process? What is the difference between ergodic & stationary process.
- c) Consider a random voltage V having a probability density function with the following shape.



- i) Find the value of a
- ii) Find the mean value of the voltage
- iii) Find the variance of the voltage

Q2) Solve any two **[16]**

- a) What is CDF? Explain its properties in brief with proof.
- b) Explain differential pulse code modulation (DPCM) transmitter and receiver with block diagram.
- c) What is slope overload distortion and granular noise in delta modulation? Explain how it is removed in ADM.

P.T.O.

Q3) Solve any two [16]

- A binary channel with capacity 36K bits/sec is available for PCM voice transmission. If signal is band limited to 3.2 K.Hz. What is the appropriate value of quantizing level L. What should be the sampling frequency.
- Explain with circuit diagram Early-Late bit synchronization.
- What are the properties of line coding? Explain with suitable examples.

Q4) Solve any two [16]

- With the help of neat block schematic and space diagram explain the QAM transmitter and receiver.
- Compare BASK/BPSK/BFSK modulation technique w.r.t. BW requirement/SNR/Detection method and complexity.
- With the block diagram explain the QPSK system in details.

Q5) Solve any two [16]

- Draw and explain matched filter and correlation receiver.
- Explain eye pattern with suitable diagram.
- Explain correlative coding technique using Duo-binary signaling.

Q6) Solve any two [18]

- Explain generation and properties of PN sequence.
- With neat diagram explain Frequency Hopping spread spectrum transmitter and receiver.
- Write short note on Ranging application using CDMA.



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**T.E. (Electronics) (Semester - VI) (Revised) (New) Examination,
November - 2018**

DIGITAL SIGNAL PROCESSING

Sub. Code : 66851

Day and Date : Monday, 12 - 11 - 2018

Total Marks : 100

Time : 02.30 p.m. to 05.30 p.m.

- Instructions :**
- 1) **Figures to the right indicate full marks.**
 - 2) **Assume suitable data if required.**

Section - I

Q1) Attempt any two **[18]**

- a) Explain in detail Radix 2 DIT FFT.
- b) Differentiate between overlap save and overlap Add Method.
- c) An 8 point sequence is given by $x(n) = \{3, 1, 3, 1, 1, 3, 1, 3\}$. Compute 8 point DFT of $x(n)$ by Radix 2 DIF FFT.

Q2) Attempt any two **[16]**

- a) What are the various Applications of Wavelet Transform? Explain.
- b) Explain in detail different properties of Wavelet Transform.
- c) Explain in detail Fourier Series Method of FIR Digital Filter Design.

Q3) Attempt any two **[16]**

- a) Explain in detail FIR Filter Design Using Window Function.
- b) Design a FIR High pass filter with cutoff frequency of 1.5 KHz and sampling frequency of 5KHz with 7 samples using Fourier series method.
- c) Design a linear phase FIR Low pass filter using Rectangular window by taking 7 samples of window sequence and with cutoff frequency, $\omega_c = 0.2\pi$ rad/sample.

P.T.O.

Section - II**Q4)** Attempt any two**[18]**

- Explain in detail Bilinear Transformation method for Design of IIR Filter.
- Convert the analog filter with system Transfer Function, $H(s) = \frac{(s+0.1)}{(s+0.1)^2 + 9}$ into a Digital IIR by Means of the Impulse invariant Method.
- Design a Butterworth IIR High pass filter using Bilinear transformation by taking $T = 0.5$ sec. to satisfy the following specifications.

$$0.707 \leq |H(e^{j\omega})| \leq 1.0; \quad \text{for } 0.65\pi \leq \omega \leq \pi$$

$$|H(e^{j\omega})| \leq 0.2; \quad \text{for } 0 \leq \omega \leq 0.45\pi$$

Q5) Attempt any two**[16]**

- Explain in detail finite word length effects in digital filter.
- The transfer function of the system is given by, $H(z) = \frac{(2-z^{-1})(1-z^{-1})^2}{(1-2s^{-2})(5-3s^{-1}+2s^{-2})}$ realize the system in cascade structure.
- Explain in detail the architecture of TMS320C67 xx.

Q6) Attempt any two:**[16]**

- Write a note on 'Need of Multirate Digital Signal Processing'.
- What is sampling rate conversion by rational factor $\frac{I}{D}$.
- Explain any eight identities used in multirate digital signal processing.



Seat No.	
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T.E. (Electronics) (Semester - VI) Examination, November - 2018**VIDEO ENGINEERING****Sub. Code : 66852****Day and Date : Tuesday, 13 - 11 - 2018****Total Marks : 100****Time : 02.30 p.m. to 05.30 p.m.**

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

SECTION-I**Q1) Attempt any Three.****[18]**

- a) Draw and explain composite video signal for chess board pattern.
- b) What do you understand the positive and negative modulation? Justify the choice of negative modulation for TV transmission.
- c) Define the following terms related to TV system:
 - i) Aspect ratio.
 - ii) Picture to sync ratio.
 - iii) Kell factor.
 - iv) Luminance
 - v) Hue.
 - vi) Saturation
- d) Explain with suitable diagram a construction and working of condenser microphone.

Q2) Attempt any Two.**[16]**

- a) Explain horizontal resolution used in the TV and obtain the expression for video bandwidth.

- b) Explain with suitable block diagram the working of the PAL encoder.
- c) What are the drawbacks of a delta-gun colour picture tube? Describe constructional details of a P.I.L. tube and explain how it is different from a delta-gun color tube. What are its distinguishing features?

Q3) Attempt any Two.

[16]

- a) State and explain advantages of Interlace scanning with suitable diagram. Explain interlaced scanning process. What is Interlace error?
- b) Draw and explain with suitable block diagram the working of low level IF modulated color TV transmitter.
- c) Draw cross-sectional view of an image orthicon camera tube and explain how it develops video signal when light from any scene is focused on its face plate.

SECTION-II

Q4) Attempt any Three.

[18]

- a) Draw and explain the multiplexed analog component encoding format used for transmitting colour television signals.
- b) What is Plasma? How its presence results in the flow of charge when a small voltage is applied across a plasma glass panel? How this results in the release of colour photons?
- c) What is need of MAC Encoding? Explain the general format of MAC signal for transmitting colour Television Signals.
- d) Explain with the diagram basic satellite system with uplink and downlink frequencies used for television.

Q5) Attempt any Two.

[16]

- a) Draw the block diagram of Video Processor VPU-2203 and explain digital signal processing carried out in it.(ITT).

- b) With the suitable diagram explain the working of the different types of LCD matrix used for television.
- c) With suitable block diagram explain the working of IR remote control used for television receiver.

Q6) Attempt any Two.

[16]

- a) Draw the block diagram of deflection processor DPU-2553(ITT) and explain digital signal processing carried out in it.
- b) Draw the structures of plasma display panel (PDP) used for television and explain its working.
- c) Describe the main merits and application of CATV system. Draw typical layout of this system of signal distribution and label all the blocks. Why the amplifiers and equalizers are required along trunk distribution lines?



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T.E. (Electronics Engineering) (Semester - VI) (Revised)**Examination, November - 2018****POWER ELECTRONICS****Sub. Code : 66853****Day and Date : Wednesday, 14 - 11 - 2018****Total Marks : 100****Time : 02.30 p.m. to 05.30 p.m.**

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

SECTION-I**Q1) Attempt any three.****[18]**

- a) Explain in detail class B turnoff method.
- b) Explain in detail GTO
- c) Draw the dynamic characteristics of SCR during turn on Also define Rise time, delay time, spreading time and Rise time.
- d) Explain firing circuit of SCR using UJT. (Unijunction transistor)

Q2) Attempt any two.**[16]**

- a) With neat circuit diagram and waveform explain the operation of firing circuit of SCR using PUT.
- b) Draw VI characteristics & construction of TRIAC, and also Explain following mode of operation with its equivalent diagram.
 - i) MT1 positive w.r.t. MT2 and gate is positive.
 - ii) MT1 Negative w.r.t. MT2 and gate is negative.
- c) Derive the equation of average output voltage and rms output voltage of single phase mid point converter with RL load.

Q3) Attempt any two.**[16]**

- a) A single phase fully controlled converter is supplied at 120 Volt. Then calculate average output voltage for $\alpha = 0^\circ$ and $\alpha = \frac{\pi}{2}$. Assuming continuous load current. Also calculate PIV of SCR.
- b) With the help of circuit diagram & waveform explain operation of single phase bridge controlled converter with RLE load, for constant current mode of operation.

P.T.O.

- c) Write short notes on:
- Comparison of IGBT & MOSFET
 - Draw & explain optocoupler based isolation technique.

SECTION-II

Q4) Solve any two. [2 × 8 = 16]

- Draw & explain step-up chopper with R-L load in brief.
- Give the detailed circuit analysis of class - D chopper. Derive the expression of O/P power also.
- A single phase bridge inverter supplies resistive load of 3Ω and de input voltage of 48V then calculate.
 - Switch rating
 - THD
 - Distortion factor
 - Harmonic & distortion factor of (Lowest Order Harmonic) LOH

Q5) Solve any two. [2 × 8 = 16]

- Explain in detail CVT.
- Explain the operation of single - phase bridge inverter with the help of voltage waveforms with R-L load.
- Explain multiple PWM voltage control technique in single phase inverter.

Q6) Solve any three. [3 × 6 = 18]

- Explain on-line and off-line UPS in brief.
- Draw and explain servo type voltage stabilizer.
- Explain single phase preventer in detail.
- Derive the equation of load ripple current with R-L load for step-down chopper (Assume continuous current mode)



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T.E. (Electronics Engineering) (Part - II) (Semester - VI) (Revised)**Examination, November - 2018****COMPUTER ARCHITECTURE & OPERATING SYSTEMS****Sub. Code : 66854****Day and Date : Thursday, 15 - 11 - 2018****Total Marks : 100****Time : 02.30 p.m. to 05.30 p.m.**

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

SECTION - I**Q1) Answer Any Two of the following. [16]**

- a) Explain carry look ahead adder with the help of suitable diagram.
- b) Explain the complete two's complement adder- subtractor.
- c) Explain combinational array multiplier.

Q2) Answer Any Two of the following. [16]

- a) Describe GCD processor with the help of hardware block diagram & state table.
- b) Explain Design of a DMA controller indicating Control signals, state transition graph & state table.
- c) Define the terms-
 - I) Multiprogramming
 - II) Spooling
 - III) Scheduler
 - IV) Assembler.

Q3) Answer Any Three of the following. [18]

- a) Describe design steps of Roberson's multiplication algorithm.
- b) Describe the design of pipeline processor structure with suitable diagram.
- c) Draw computer hardware & software infrastructure and explain it in brief
- d) Describe the role of assembler, linker & loader with suitable block diagram.

P.T.O.

SECTION - II

Q4) Answer Any Two of the following. [16]

- a) Define the terms-
 - i) Semaphore
 - ii) Mutual exclusion
 - iii) Starvation
 - iv) Live lock.
- b) What is Process Control Block? Explain with suitable diagram.
- c) Explain monitors with suitable diagram.

Q5) Answer Any 'Two of the following. [16]

- a) Explain process state transition diagram.
- b) What is deadlock? Explain the dead lock prevention & avoidance.
- c) Explain the mechanism of paging & segmentation in brief

Q6) Answer Any Three of the following. [18]

- a) Explain the Process & Threads.
- b) Describe the Producer- Consumer IPC Problem.
- c) Explain the FIFO Page replacement algorithm.
- d) What is virtual memory? Explain demand paging.



Seat No.	
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T.E. (Electronics) (Semester - VI) Examination, November - 2018**ELECTRONIC SYSTEM DESIGN****Sub. Code : 66855****Day and Date : Friday, 16 - 11 - 2018****Total Marks : 100****Time : 02.30 p.m. to 05.30 p.m.**

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Draw neat circuit diagram where ever necessary.
 - 4) Clearly specify assumptions if any.
 - 5) Numbers to right indicate full marks.
 - 6) Write answers to bits in questions at one place and in sequence. Do not place answers randomly.

SECTION - I**Q1) Answer any two of the following : [18]**

- a) Explain the importance of reliability considerations with the help of bathtub curve.
- b) Design a circuit to interface a TTL output with a CMOS logic device operating at 10 V.
- c) An operational amplifier designed to work as inverting amplifier with gain of 20. If input voltage is + 1 volt and op-amp is supplied with $\pm 10V$ power supply, what will be the output voltage of an amplifier? **Draw neat circuit diagram and justify.**
- d) What is the role of pull up and pull down resistors connected on digital line? Explain the parameters used to decide the value of pull up or pull down resistor.

Q2) Answer any two of the following : [16]

- a) What is the role of span and zero (gain and offset) circuits in signal conditioning?
- b) Design a signal conditioning circuit for PT100 that delivers full scale output voltage of 0 to 10 volts, when temperature changes between $0^{\circ}C$ to $100^{\circ}C$.
- c) Design a V to I converter that delivers 4mA to 20 mA current to a floating load, over its full scale input voltage between 1V to 2V.

P.T.O.

Q3) Answer any two of the following : [16]

- Design a proportional controller that works with 20% proportional band, Maximum error is $\pm 3V$, Full scale output is 10V and zero error causes 50% of controller output.
- Explain with hardware diagram how a serial ADC can be connected to microcontroller. If microcontroller is working as master writing the command to ADC, what will be the first byte transmitted by master. 7 bit address of ADC is 03H. Explain I²C communication protocol.
- Draw neat interfacing diagram to interface three common cathode seven segment LED displays to 8051 family of microcontroller. Use P0 to interface seven segments and dp sequentially and use P1.0 to P1.2 to interface display scan lines. (Show the drivers wherever necessary). Write an algorithm or draw a flow chart that shows the steps to be taken by programmer to display numbers on all LED display modules.

SECTION - II

Q4) Solve any three.

- What is bio potential? How action potentials produce ECG signal? Discuss electric characteristics of ECG signal. [6]
- With suitable diagram explain single point, Multi-point and Hybrid ground systems. [6]
- Compute value of decoupling capacitor for digital IC if, ΔICC takes 50 ma current at clock rising edge/falling edge in period 6ns. Note permissible fall in V_{cc} at that instant should not be more than 0.25 volts for proper functioning of the IC. [6]
- What are advantages of using a ground plane while PCB design? [6]

Q5) Solve any two.

- Design a 2 stage ECG amplifier with following specifications [8]
 - Gain of first stage using instrumentation amplifier = 25
 - Gain of second stage should be 32, incorporating band pass filter with 3dB lower and upper cutoff frequency of 0.05Hz to 150Hz respectively.

- b) Design active photodiode current to voltage converter (to be used in pulse oximeter) for maximum current of photodiode is 100 micro ampere and desired maximum output voltage of 1.023 volts. Discuss method to reduce gain peaking, step output ringing and noise gain peaking (assume suitable data if necessary). [8]
- c) Plan design and schematic of peristaltic pump drug delivery system. [8]

Q6) Solve any two.

- a) Design a SMPS with input voltage range of 10V to 20V DC and desired output voltage is 5 Volts DC with ripple less than 100mv. The load current is not more than 1 Amps. Provide current limit to protect power supply against over loading. [8]
- b) Plan and draw schematic of SMPS to provide multiple outputs : 5 Volts 3 amps : ripple not more than 100mv, + 12 Volts 500ma, -12 Volts 500ma. The input to the SMPS is 24 Volts DC. Use suitable SMPS controller IC. Design ferrite core transformer for above SMPS. [8]
- c) Draw block diagram of SMPS controller IC and explain any four blocks of it. [8]

