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**M.Sc. (Part – I) (Semester – I) (CBCS) Examination, 2015**  
**ELECTRONICS (New)**  
**Paper – I : Numerical Methods**

Day and Date : Monday, 16-11-2015  
Time : 10.30 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :** 1) Answer **five** questions.  
2) Question **1** and **2** are **compulsory**.  
3) Attempt **any three** from Q. 3 to Q. 7.  
4) Figures to the **right** indicate **full marks**.

1. A) Choose correct answer :

8

- 1) On Laplace transformation, the function converts from
  - a) time domain to frequency domain
  - b) frequency domain to time domain
  - c) time domain to amplitude domain
  - d) amplitude domain to time domain
- 2) If data consist n number of points, then  $n^{\text{th}}$  order forward difference is always
  - a) one
  - b) two
  - c) zero
  - d) infinity
- 3) For set of points of unequal interval \_\_\_\_\_ method of interpolation is suitable.
  - a) Cubic splines
  - b) Newton's forward difference
  - c) Lagrangian
  - d) All of these
- 4) For RK – 2 order method Taylors Series can be truncated from
  - a)  $O_h^5$
  - b)  $O_h^3$
  - c)  $O_h^2$
  - d) All of these
- 5) Laplace transform of  $f(t) = t^3$  is given by  $F(s) =$ 
  - a)  $1/S$
  - b)  $(6)/(S)$
  - c)  $(24)/S^3$
  - d)  $(6)/(S^4)$

P.T.O.



- 6) The R-2R ladder network can be solved by using \_\_\_\_\_ matrix system of equations.
- a) Tridiagonal    b) U-matrix  
c) L-matrix    d) All of these
- 7) For Newtons forward difference  $\Delta^2 Y_0 =$
- a)  $E^2$     b)  $(E - 1)^2$   
c)  $(E + 1)^2$      d) All of these
- 8) The Least squares method of curve fitting is developed by considering
- a) minimization of data points                    b) minimization of error  
c) maximization of data points                    d) maximization of errors

**B) State true or false :**

**6**

- 1) In Gauss-Jordon elimination method, the coefficient matrix must be reduced to unit matrix.
- 2) Round-off error is the difference between observed value and theoretical value.
- 3) Laplace transformation of  $e^{\alpha t} = 1/(s - \alpha)$ .
- 4) Lagrangian Interpolation formula gives third order polynomial.
- 5) Simpson 3/8 rule ensures pairs 4 points.
- 6) Laplace transformation converts frequency domain function into time domain.

**2. A) Attempt any two :**

**10**

- 1) Derive expression for Laplace transformation of  $f(t) = \cos \omega t$ .
- 2) What do you mean by Pivoting ?
- 3) Solve :

$$x_1 - x_2 + x_3 = 4$$

$$2x_1 + 4x_2 + x_3 = 6$$

$$x_1 + x_2 + 5x_3 = -2$$

**B) Write a note on Lagrangian method of interpolation.**

**4**



3. A) Describe formation of system of linear equations. Describe Gaussian Jordan elimination method for solution of system of linear equations. **8**

B) Evaluate by using trapezoidal method **6**

$$I = \int_0^1 (1+x) dx$$

4. A) Describe in detail the analysis of RL circuit by using Laplace Transformation. **8**

B) Find first order derivative  $f'(x)$  at  $x = 6$ . **6**

X = 2	4	6	8	10
Y = 1.583	1.797	2.044	2.325	2.651

5. A) With suitable example describe Least Squares method of curve fitting. **8**

B) Fit following data to the Straight line **6**

X = 0	5	10	15	20	25
Y = 10	14	19	25	31	36

6. A) What do you mean by quadrature ? Describe in detail the Newton Cote formal for numerical integration. **8**

B) Using Newton's backward difference interpolation method find  $y(15)$  for following data points. **6**

X = 10	20	30	40	50
Y = 9.21	17.54	31.82	55.32	92.51

7. A) Describe R-K method of finding solution of first order ordinary differential equation. **8**

B) Using RK-II order method find value of  $y(0.2)$ . Given that

$$\frac{dy}{dx} = x^2 - y \text{ and } y(0) = 1. \quad \mathbf{6}$$

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**M.Sc. (Part – I) (Semester – I) Electronics Examination, 2015**  
**INSTRUMENTATION DESIGN (New CBCS)**  
**Paper No. – II**

Day and Date : Wednesday, 18-11-2015

Max. Marks : 70

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

- Instructions :** 1) *Q. 1 and Q. 2 are compulsory.*  
2) *Attempt any three from Q. 3 to Q. 7.*  
3) *Figures to the right indicate full marks.*  
4) *Use of non-programmable calculator is allowed.*

1. Objective type questions :

8

A) Choose a correct alternative :

- 1) Piezoelectric crystal can produce an emf
  - a) When external mechanical force is applied to it
  - b) When radiant energy stimulates the crystal
  - c) When external magnetic field is applied
  - d) When the junction of two such crystals are heated
- 2) The transducers which requires an external power and their output is a measure of some variation such as resistance, inductance, capacitance etc. are called as
  - a) Active transducer
  - b) Primary sensor
  - c) Passive transducer
  - d) Self generating transducer
- 3) LVDT windings are wound on
  - a) Steel sheets
  - b) Aluminium
  - c) Ferrite
  - d) Copper
- 4) The sensitivity factor of strain gauge is normally of the order of
  - a) 1 to 1.5
  - b) 1.5 to 2.0
  - c) 0.5 to 1.0
  - d) 5 to 10

P.T.O.



- 5) Wheatstone bridge has got three resistances taken in one direction as  $120.3\ \Omega$  ,  $119.2\ \Omega$  and  $119.2\ \Omega$  . The value of the fourth resistance for null balance would be
- a)  $119.2\ \Omega$                   b)  $120.3\ \Omega$                   c)  $120.0\ \Omega$                   d)  $118.2\ \Omega$
- 6) Static force calibration can be carried out with
- a) live weights                                  b) null weights
- c) dead weights                                  d) none of these
- 7) A chromatograph is used for
- a) measuring a flow rate of gas
- b) measuring the temperature of the gas
- c) analysing the compensation of the gas
- d) measuring the pressure of the gas
- 8) The temperature to which a vapor gas mixture must be cooled (at varying humidity) to saturate it is
- a) dew point                                  b) wet bulb temperature
- c) atmospheric temperature                  d) none of these

B) State **true** or **false** :

6

- 1) A data logger has a hold device to hold the analog signal at its previous value till it is digitized.
- 2) A piezo-electric type load cell is preferred over other devices for measuring static forces.
- 3) Response and sensitivity of a thermocouple is improved by using heavy gauge wire (i.e. bigger diameter wire).
- 4) The obstruction type of flow meters have a linear relationship between the pressure difference and the rate of fluid flow.
- 5) To display the data on the LCD, data must be in the form of ASCII value.
- 6) LVDT is not a self-generating type transducer.



2. A) Attempt **any two**. **(2×5=10)**
- 1) Explain the proximity type inductance transducer.
  - 2) Draw and explain V to F convertor.
  - 3) What is calibration and what is its importance ?
- B) Explain loading effect in instrumentation system. **4**
3. A) What are the internal blocks of AD595 ? Explain use of AD595 as a set point controller. **8**
- B) Describe the reference junction compensation of thermocouple. **6**
4. A) Explain bonded resistance wire strain gauges and derive the expression for gauge factor. **8**
- B) Discuss the factors affecting the sensitivity of the strain gauges. **6**
5. A) Explain the NTC characteristics of thermistor. What are the different type of thermistor ? Explain advantages and limitations of thermistor. **8**
- B) Explain Seebeck effect and Peltier emf in association with thermocouple. **6**
6. A) Draw and explain the A.C. and D.C. type circuits associated with capacitive transducer. **8**
- B) Define error. What are different types of error ? Explain them in briefly. **6**
7. A) Explain the designing of instrumentation for measurement of humidity. **8**
- B) What are data loggers ? What are the functions of a data logger ? **6**
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**M.Sc. – I (Semester – I) Examination, 2015**  
**ELECTRONICS (CBCS) (New)**  
**Paper – III : Power Electronics**

Day and Date : Friday, 20-11-2015

Total Marks : 70

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

- Instructions :** 1) Attempt **five** questions.  
2) Question **1 and 2** are **compulsory**.  
3) Attempt **any three** from Q. 3 to Q. 7.  
4) Figures to the **right** indicate **full** marks.

1. A) Choose correct answer :

8

- 1) In single pulse modulation of PWM inverter third harmonics can be eliminated if pulse width is equal to
  - a)  $\pi/6$
  - b)  $\pi/3$
  - c)  $2\pi/3$
  - d)  $\pi/2$
- 2) The chopper feeds resistive load 'R' its effective O/P resistance is \_\_\_\_\_ (where k is the duty cycle).
  - a) kR
  - b)  $\sqrt{kR}$
  - c) R/k
  - d) None of these
- 3) The step up chopper feeds the DC motor. If the source voltage is 100 V and duty cycle is 0.5. The O/P voltage for this chopper is
  - a) 100 V
  - b) 150 V
  - c) 200 V
  - d) 250 V
- 4) The dv/dt protection is achieved by connecting
  - a) RC across power devices
  - b) Inductor across the power device
  - c) Inductor in series with power devices
  - d) Capacitor across devices
- 5) In a cycloconverter it is possible to vary
  - a) Only output frequency
  - b) Only output voltage
  - c) Both output voltage and frequency but not simultaneously
  - d) Both output voltage and output frequency simultaneously

P.T.O.



- 6) A single-phase bridge VSI has inductor as the load for a constant source voltage, the current through the inductor is \_\_\_\_\_ wave.
- a) Square
  - b) Triangular
  - c) Sine
  - d) Pulsed
- 7) Class D commutation is a
- a) Auxiliary commutation
  - b) Impulse commutation
  - c) Voltage commutation
  - d) All of the above
- 8) In choppers, for chopping period  $T$ , the output voltage can be controlled by varying
- a)  $T$  keeping  $T$  on constant
  - b)  $T$  on keeping  $T$  constant
  - c)  $T$  off keeping  $T$  constant
  - d) None of these

B) State **true** or **false** :

6

- 1) All inverters use forced commutation.
- 2) As the load is purely resistive, the load current will be in phase with the load voltage.
- 3) PWM control chopper is generally used for motor control.
- 4) AC voltage controller can be used to drive high power induction motor.
- 5) A half converter uses only thyristors.
- 6) Class A chopper operates as an inverter.

2. A) Attempt **any two** of the following :

10

- 1) With circuit diagram describe operation of McMurray half inverter.
- 2) Give advantages and disadvantages of bidirectional controller.
- 3) Explain the role of freewheeling diode in controlled rectifiers.

B) Discuss the concept of power factor improvement.

4

3. A) Discuss principle of operation of step down chopper with resistive load. Derive necessary equations.

8

B) The step down chopper has resistive load of 10 ohm and the I/P voltage is 200 V. When chopper is turned on the voltage drop across the switch is 2V, the chopping frequency is 2KHz. If duty cycle is 50% determine average O/P voltage and RMS O/P voltage.

6





- 4. A) With the help of neat circuit diagram and associated waveforms. Explain operation of half bridge inverter with resistive load and derive equation for output voltage. **8**
  - B) A single phase half bridge inverter has resistive load of 2 ohm and I/P voltage of 24 V. Calculate average current, peak current. **6**
  - 5. A) With neat circuit diagram and waveform explain the operation of the full wave controlled rectifier, which feeds the inductive load. **8**
  - B) Derive the relations for average O/P voltage and r.m.s. O/P voltage. **6**
  - 6. A) With circuit diagram describe the operation bidirectional AC voltage controller. **8**
  - B) Explain operation of three phase half wave controlled rectifier. Draw waveforms. **6**
  - 7. A) Explain in details the three phase to single phase cycloconverter. **8**
  - B) Microcontroller based firing scheme for cycloconverter. **6**
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M.Sc. – I (Semester – II) Examination, 2015  
ELECTRONICS (New CGPA)  
Paper – V : Control Theory

Day and Date : Tuesday, 17-11-2015

Max. Marks : 70

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

- Instructions:** 1) Answer **five** questions.  
2) Questions **1 and 2** are **compulsory**.  
3) Attempt **any three** from Q. 3 to Q. 7.  
4) Figures to the **right** indicates **full** marks.

1. a) Choose correct answer :

8

- 1) If all the roots of the characteristic equation have \_\_\_\_\_ real part, the system is stable.
  - a) positive
  - b) negative
  - c) both a) and b)
  - d) none of these
- 2) For type-O system, the steady state unit ramp error is
  - a)  $\infty$
  - b) 1
  - c)  $\frac{1}{5}$
  - d) both a) and b)
- 3) \_\_\_\_\_ is most sensitive to the presence of non linearities.
  - a) Open loop system
  - b) Close loop system
  - c) Stable system
  - d) Unstable system
- 4) In open loop system, the control action is \_\_\_\_\_ of the output.
  - a) dependent
  - b) independent
  - c) only a)
  - d) none of these
- 5) \_\_\_\_\_ control system is also known as rate control.
  - a) proportional
  - b) integral
  - c) derivative
  - d) both a) and b)



- 6) Which of the following technique gives quick transient and stability response ?
  - a) Root locus
  - b) Nyquist
  - c) Bode
  - d) Polar
- 7) Feed back system has advantage of \_\_\_\_\_ transient response.
  - a) Improving
  - b) Decreasing
  - c) Both a) and b)
  - d) None of these
- 8) \_\_\_\_\_ is time domen test.
  - a) Bode plot
  - b) Root locus plot
  - c) Nyquist criterion
  - d) None of these

b) State **true** of **false** : **6**

- 1) The transfer function equation determines the system dynamics.
- 2) A high damping ratio will be a high overshoot.
- 3) Root locus is a frequency domain test.
- 4) Proportional control system is also known as multiposition system.
- 5) Nyquist criteria gives direct value of corner frequency.
- 6) For type one system, the steady state acceleration error is zero.

2. a) Solve **any two** : **10**

- 1) Write note on proportional derivative control system.
- 2) Write note on standard test signal.
- 3) Write note on stability of system.

b) Explain advantages of feedback system in detail. **4**

3. a) Write note on regenerative feedback system. **8**

b) Write note on poles and zeros. **6**

4. a) Explain Routh stability criterion. **8**

b) Compare open loop and close loop control system. **6**

5. a) Effect of feedback on system dynamics. **8**

b) Sketch the polar plot of  $G(j\omega) = \frac{1}{1 + j\omega t}$ . **6**

6. a) Explain correlation between time and frequency response. **8**

b) Write note on steady state error. **6**

7. a) Explain all pass an minimum phase system. **8**

b) Explain roll of controllers in process industry. **6**



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**M.Sc. (Part – I) (Semester – II) (New) Examination, 2015**  
**ELECTRONICS (CGPA)**  
**Paper – VI : Real Time Operating System**

Day and Date : Thursday, 19-11-2015

Max. Marks : 70

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

- Instructions:** 1) Answer **five** questions.  
2) Question 1 and 2 are **compulsory**.  
3) Attempt **any three** from Q. 3 to Q. 7.  
4) Figures to the **right** indicate **full** marks.

1. A) Choose correct alternative :

8

- 1) Normally, the output of ADC of AVR At *Mega8L* is
- a) Right Justified
  - b) Center Justify
  - c) Left Justified
  - d) None of these
- 2) Hard real time system is
- a) Reversible
  - b) Irreversible
  - c) Time independent
  - d) None of these
- 3) \_\_\_\_\_ is the fundamental characteristics of the task.
- a) Stack size
  - b) Time schedule
  - c) Priority
  - d) Context
- 4) Which of the following is the suitable solution avoid priority inversion ?
- a) Semaphore
  - b) Mutex
  - c) Static priority
  - d) None of these
- 5) To avoid starvation of the processor \_\_\_\_\_ task O should be created.
- a) idle
  - b) ideal
  - c) system
  - d) all of these
- 6) If two tasks share a common resource then \_\_\_\_\_ condition occurs.
- a) spinlock
  - b) livelock
  - c) dead lock
  - d) race condition



- 7) The Kernel of the RTOS should provide \_\_\_\_\_ to the task.
- a) Memory management                      b) Resource management  
c) Time management                         d) All of these
- 8) To establish intertask communication \_\_\_\_\_ object of the RTOS Kernel is deployed.
- a) Semaphore                                      b) Mutex  
c) Message box                                  d) P thread

- B) State **true** or **false** : **6**
- 1) To design system for pH measurement the pH electrode should be supplied with D.C source.
  - 2) The task is an example of endless loop.
  - 3) In round-robin scheduling the tasks are pre-empted upon execution.
  - 4) On acquire the semaphore counter increments by two.
  - 5) RT Linux Kernel is the super imposition of real time Kernel on Linux Kernel.
  - 6) Micro C/OS – II kernel is not suitable for AVR microcontrollers.
2. A) Attempt **any two** : **10**
- 1) Write a note on FSM of the task.
  - 2) What do you mean by priority ?
  - 3) With the suitable diagram, describe the composition of embedded system with AVR microcontroller.
- B) What do you mean by context switching ? **4**
3. A) What do you mean by scheduling ? Describe priority based pre-emptive scheduling mechanism. **7**
- B) Describe structure of the task. **7**
4. A) Describe in detail the architecture of the Kernel of RT Linux. **7**
- B) What do you mean by thread ? Differentiate the task and thread. **7**
5. A) Define the term RTOS. Give the characteristics of RTOS. Describe Hard and soft real time system. **7**
- B) Write a problem in RTOS to read ADC data. Create 4 task. **7**
6. A) Describe in detail the Kernel object "Semaphore". **7**
- B) What do you mean by intertask communication ? **7**
7. A) Describe designing of an embedded system to measure humidity. **7**
- B) Write a note on priority inversion. **7**
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**M.Sc. (Part – I) (Semester – II) (New) Examination, 2015  
ELECTRONICS (CGPA)  
Paper – VII : Opto Electronics**

Day and Date : Saturday, 21-11-2015

Total Marks : 70

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

- Instructions :** 1) Q. 1 and 2 are **compulsory**.  
2) Solve **any three** from Q. 3 to Q. 7.  
3) Figures to the **right** indicate full marks.  
4) **All** questions carry **equal** marks.

1. A) Choose correct alternative :

8

- 1) \_\_\_\_\_ is the magneto optical phenomenon.
  - a) Faraday's effect
  - b) Faraday law
  - c) Kerr effect
  - d) All of these
- 2) Total internal reflection occurs when
  - a) angle of incidence  $\geq$  critical angle
  - b) critical angle  $\geq$  angle of incidence
  - c) angle of incidence = critical angle
  - d) None of these
- 3) In surface emitting LED, the light emitting region is \_\_\_\_\_ to the axis of the fiber.
  - a) Parallel
  - b) Perpendicular
  - c) Tangential
  - d) None of these
- 4) In semiconductor detectors \_\_\_\_\_ current of the diode increases linearly with increase in incident light.
  - a) Forward
  - b) Reverse
  - c) Leakage
  - d) All of these



- 5) Birefringence phenomenon occurs due to \_\_\_\_\_ of the material.
- a) Uniform refractive index                      b) Variable refractive index  
c) Unity refractive index                        d) None of these
- 6) \_\_\_\_\_ is used to shift the direction of polarization of linearly polarized light.
- a) Half wave plate                                b) Quarter waveplate  
c) Retarder                                        d) All of these
- 7) The Kerr effect demonstrate change in refractive index due to change in applied
- a) Magnetic field                                b) Electric field  
c) Acoustic field                                 d) None of these
- 8) LASER is \_\_\_\_\_ source of light.
- a) Coherent                                        b) Incoherent  
c) Incandiscent                                 d) None of these

B) State **True** or **False** :

**6**

- 1) In single mode step index fiber the RI of core is uniform throughout core.
- 2) Pockel's cell works with the linear electro-optic effect.
- 3)  $\text{LiNbO}_3$  is not optically active material.
- 4) Optically anisotropic materials are called birefringent material.
- 5) Acousto-optic devices are operating with magnetic field.
- 6) VAD is the continuous fiber fabrication process.

2. A) Attempt **any two** :

**10**

- 1) Describe the construction of optical fiber.
- 2) Write a note on photo transistor.
- 3) What do you mean by splicing ?

B) Write a note on LED as optical source.

**4**



3. A) What do you mean by light intensity modulation ? Describe in detail the phenomenon of birefringence. **10**  
B) Write a short note on quarter wave plate. **4**
  4. A) Describe in detail the operating principle of photo diode. Mention the characteristics of optical detector. **10**  
B) Write a note on numerical aperture. **4**
  5. A) Describe in detail an electro optic effect for light modulation. What is Pockel's cell ? **10**  
B) Discuss the cable design parameters. **4**
  6. A) With neat labelled diagram describe the use of He-Ne LASER as optical source. **10**  
B) What do you mean by optical anisotropy ? **4**
  7. A) Describe magneto optic effect in detail. What do you mean by AO modulator ? **10**  
B) Describe the method of loss measurement. **4**
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**M.Sc. (Part – I) (Semester – II) (New) Examination, 2015**  
**ELECTRONICS (CGPA)**  
**Paper – VIII : Signals and Systems**

Day and Date : Tuesday, 24-11-2015

Total Marks : 70

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

- Instructions :** 1) Answer **five** questions.  
2) Question **1** and **2** are **compulsory**.  
3) Attempt **any three** from Q. **3** to Q. **7**.  
4) Figures to the **right** indicates **full** marks.

1. A) Choose the correct answers :

**8**

- 1) A continuous time signal  $x(t)$  is said to be periodic if it satisfies the condition
- a)  $x(t + T) = x(t)$                       b)  $x(t) = x(\pi + t)$   
c)  $x(n + N) = x(n)$                       d)  $x(t) = -x(t)$
- 2) A signal  $x(t)$  is called an power signal if the power satisfies the condition
- a)  $0 > p > \infty$                               b)  $0 < p < \infty$   
c)  $0 < E < \infty$                               d) none of these
- 3) If a periodic signal has an even symmetry the Fourier series contains
- a) Only sine term                              b) Only cosine terms  
c) Constant and cosine terms              d) Both sine and cosine terms
- 4) If  $x(t)$  is even, then its Fourier series coefficient must be
- a) real and even                              b) real and odd  
c) imaginary and even                        d) imaginary and odd
- 5) A signal which can be described by a mathematical expression is called as \_\_\_\_\_ signal.
- a) power    b) deterministic  
c) random                                        d) energy





- 3. A) State the different properties of Fourier series and explain any two in detail. **8**  
B) Write a note on Fourier series representation of periodic signals. **6**
- 4. A) Define a system. How the system are classified ? **8**  
B) A discrete time signal is given by  $x(n) = \{1, 2, 1, 1, 2, 1\}$ . Sketch the following signal. (i)  $x(-n + 2)$  (ii)  $x(n).u(n - 2)$  (iii) Even samples of  $x(n)$ . **6**
- 5. A) Prove that LTI system is stable if its impulse response is absolutely summable. **8**  
B) Sketch the continuous-time signal  $x(t) = 2 \sin \pi t$  for an interval  $0 \leq t \leq 2$  sample the continuous time signal with sampling period  $T = 0.2$  sec. and sketch the discrete time signal. **6**
- 6. A) For the following signals, determine and sketch convolution  $y(n)$ . **8**

$$\begin{aligned} x(n) &= \frac{1}{3} n && 0 \leq n \leq 6 \\ &= 0 && \text{otherwise} \\ \text{and } h(n) &= 1 && -2 \leq n \leq 2 \\ &= 0 && \text{otherwise} \end{aligned}$$

B) Check whether the following system are linear or not.

i)  $y(n) = 2x(n) + \frac{1}{x(n-1)}$

ii)  $y(n) = \cos x(n)$ . **6**

- 7. A) Define a signla. Give in detail classification of signals. **8**  
B) State and prove linear convolution sum. **6**

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**M.Sc. (Part – II) (Semester – III) Examination, 2015**  
**ELECTRONICS (CGPA)**  
**Paper – IX : Digital Signal Processing**

Day and Date : Monday, 16-11-2015  
Time : 2.30 p.m. to 5.00 p.m.

Total Marks : 70

- Instructions :** 1) Attempt **five** questions.  
2) Questions **1 and 2** are **compulsory**.  
3) Attempt **any three** from Q. 3 to Q. 7.  
4) Figures to **right** indicates **full** marks.

1. A) Choose the correct answer :

8

- 1) The region of convergence of the z-transform of the signal  $x(n) = \{2, \underset{\uparrow}{1}, 1, 2\}$  is \_\_\_\_\_
- a) all z, except  $z = 0$  and  $z = \infty$       b) all z, except  $z = 0$   
c) all z, except  $z = \infty$                       d) all z
- 2) For a stable system
- a)  $|z| < 1$                       b)  $|z| > 1$                       c)  $|z| = 1$                       d)  $|z| \neq 1$
- 3) What is the Nyquist frequency for the signal  $x(t) = 3\cos 50\pi t + 10\sin 300\pi t - \cos 100\pi t$  ?
- a) 50 Hz                      b) 100 Hz                      c) 200 Hz                      d) 300 Hz
- 4) The function  $\frac{\sin(\pi u)}{\pi u}$  is denoted by \_\_\_\_\_
- a)  $\text{sinc}(\pi u)$                       b)  $\text{sinc}(u)$   
c)  $\text{signum}$                       d) none of these
- 5) If the Fourier series coefficients of a signal are periodic then the signal must be \_\_\_\_\_
- a) continuous-time, periodic                      b) discrete-time, periodic  
c) continuous-time, non periodic                      d) discrete-time, non periodic

P.T.O.



6) In time scaling property  $x(at)$  is expanded version of the signal  $x(t)$  by a factor  $a$ , when

a)  $a < 1$

b)  $a > 1$

c)  $a = 1$

d)  $a \neq 1$

7) z-transform of delayed unit impulse,  $\delta(n - k) = \underline{\hspace{2cm}}$

a)  $z^{-k}$

b)  $z^k$

c) 1

d) none

8) The amplitude of unit impulse function is 1 at  $\underline{\hspace{2cm}}$

a)  $n \leq 0$

b)  $n \geq 0$

c)  $n = 1$

d)  $n = 0$

B) State **true** or **false** :

6

1) Zeros are the roots of the numerator, or the value of  $Z$  for which  $X(z)$  becomes zero.

2) The result of circular and linear convolution is not same.

3) Ideal filters are practically realizable.

4) FIR has infinite memory requirement.

5) The inverse Fourier transform of  $\delta(\omega)$  is  $\frac{1}{2\pi}$ .

6) The Kaiser window method is mostly used for designing FIR system.

2. A) Attempt **any two** :

10

1) What are twiddle factors of DFT ?

2) Differentiate between z-transform and DFT.

3) Explain standard test signal.

B) Write a note on Bilinear transformation.

4

3. A) State and prove frequency and time shifting properties of FT.

8

B) Find the FT of the following signals :

6

i)  $x(t) = e^{j\omega_0 t} u(t)$

ii)  $x(t) = \cos(\omega_0 t) \cdot u(t)$ .



4. A) Develop direct form-II realization of the transfer function.

$$H(z) = \frac{3 + 3.6z^{-1} + 0.6z^{-2}}{1 + 0.1z^{-1} - 0.2z^{-2}} \quad 8$$

B) Explain direct form realization of FIR system. 6

5. A) Write a note on a properties of z-transform. 8

B) Determine the z-transform of following equations : 6

i)  $x_1(n) = \{1, 2, 3, 4, 5, 0, 7\}$   
 $\quad \quad \quad \uparrow$

ii)  $x_2(n) = \{1, 2, 3, 4, 5, 0, 7\}$ .  
 $\quad \quad \quad \uparrow$

6. A) Compute the response  $y(k)$  by 4-point DFT for the following data : 8  
 $x(n) = \{2, 1\}$  and  $h(n) = \{1, 2\}$ .

B) Explain the development and conditions required for existence of Fourier transform. 6

7. A) Given the two sequence of length 4 are 8  
 $x(n) = \{0, 1, 2, 3\}$   
 $h(n) = \{2, 1, 1, 2\}$   
Find the circular convolution.

B) Find the inverse z of  $X(z) = \frac{z}{z-1} \quad |z| > 1$ . 6

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**M.Sc. – II (Semester – III) Examination, 2015**  
**ELECTRONICS (CGPA)**  
**Paper – X : Advanced Digital Systems Design With VHDL**

Day and Date : Wednesday, 18-11-2015

Total Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

- Instructions:** 1) Q. 1 and 2 are **compulsory**.  
2) Attempt **any three** from Q. 3 to 7.  
3) Figures to the **right** indicates **full** marks.

1. A) Choose correct alternative :

8

- 1) The most commonly used logic blocker is a LUT present in \_\_\_\_\_  
a) FPGA                      b) CPLD                      c) SPLD                      d) All of these
- 2) The operand for the '&' operator is \_\_\_\_\_  
a) Multi-dimensional array                      b) Element type  
c) One-dimensional array                      d) Both b) and c)
- 3) The back-end design include \_\_\_\_\_ level abstraction of design flow.  
a) System                      b) Logic                      c) Circuit                      d) Technology
- 4) Every entity has its \_\_\_\_\_ architecture.  
a) Different                      b) Mixed                      c) Own                      d) None of these
- 5) The \_\_\_\_\_ is a mathematical way of emulating the behaviour of circuit.  
a) Simulation                      b) Programming                      c) Entity                      d) Architecture
- 6) In package STD\_LOGIC\_1164, the meaning of 'X' is \_\_\_\_\_.  
a) Forcing known                      b) Forcing unknown  
c) Forcing hex                      d) None of the above
- 7) The FPGA consume \_\_\_\_\_ power than CPLD.  
a) More                      b) Less                      c) Equal                      d) Same
- 8) The 16 # B # E 2 represents  
a)  $11 * 16^2$                       b)  $11 * 16 * 2$                       c)  $16 * 11 * 2$                       d)  $16 * 11^2$



- B) State **True** or **False** : **6**
- 1) Test bench is at the highest level in the hierarchy of the design.
  - 2) The  $\leq$  assignment operator is used to assign a value of constant.
  - 3) The synthesis is used for verification of design.
  - 4) The expression with syntax of NAND operator is illegal.
  - 5) CPLD architecture is more granular is compared to FPGA.
  - 6) In front end design the logic source is created from physical source.
2. A) Attempt **any two** : **10**
- 1) Explain the concept of macro cell.
  - 2) Discuss architecture using half-adder.
  - 3) State the features of VHDL.
- B) Draw the structure of CPLD. **4**
3. A) State the basic language element and explain operator in detail. **9**
- B) Write VHDL code for ALU. **5**
4. A) State the various sequential statements. Explain in detail care state with suitable example. **9**
- B) Write VHDL code for 4 to 1 multiplexer. **5**
5. A) State the various architecture bodies and explain in detail mixed style of body with suitable example. **9**
- B) Write VHDL code for shift register. **5**
6. A) Explain in detail EDA tools. **9**
- B) Write VHDL code for counter. **5**
7. A) Discuss in detail packages and libraries. **9**
- B) Write VHDL code for decoder. **5**
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**M.Sc. (Part – II) (Semester – III) Examination, 2015**  
**ELECTRONICS (CGPA)**  
**Paper – XI : ARM Microcontroller and System Design (Elective – I)**

Day and Date : Friday, 20-11-2015

Max. Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

- Instructions:** 1) Attempt **five** questions.  
2) Q. No. **1** and **2** are **compulsory**.  
3) Attempt **any three** from Q. No. **3** to Q. No. **7**.  
4) Figures to **right** indicate **full** marks.

1. A) Choose the correct answer :

8

- 1) Reset will change the current processor mode to \_\_\_\_\_ mode.  
a) FIQ                      b) IRQ                      c) Abort                      d) Supervisor
- 2) ARM processor can operate in \_\_\_\_\_ different modes.  
a) 7                              b) 3                              c) 5                              d) 2
- 3) \_\_\_\_\_ register is accessible in all processor modes.  
a) Link                              b) Current program status  
c) Banked                              d) Unbanked
- 4) In LPC 2148, PLL setting time is  
a) 10  $\mu$  s                      b) 100  $\mu$  s                      c) 20  $\mu$  s                      d) 50  $\mu$  s
- 5) In LPC 2148, I<sup>2</sup>C bus supports bit rates upto  
a) 100 K bit/s                      b) 200 K bit/s                      c) 300 K bit/s                      d) 400 K bit/s
- 6) \_\_\_\_\_ register is the link register.  
a) r<sub>13</sub>                              b) r<sub>14</sub>                              c) r<sub>7</sub>                              d) r<sub>0</sub>
- 7) When subroutine is called, processor stores return address in  
a) Stack pointer                              b) Link register  
c) Program counter                              d) None of these
- 8) In LPC 2148, ADC has total \_\_\_\_\_ channels.  
a) 6                              b) 8                              c) 14                              d) 12

P.T.O.



- B) State **true** or **false** : **6**
- 1) ARM stands for Advanced Reduced Machine.
  - 2) The cache is placed between main memory and core.
  - 3) In LPC 2148, on-chip oscillator operates with crystal in range of 1-25 MHz.
  - 4) Jazzel state having 16 bit instruction set.
  - 5) All instructions in ARM are conditionally executed.
  - 6) The I<sup>2</sup>C bus is multi-master bus.
2. A) Attempt **any two** : **10**
- 1) Write a note on Barrel shifter.
  - 2) Compare between ARM, Thumb and Jazze ISA.
  - 3) Explain exception priorities in ARM.
- B) State and explain the nomenclature used for ARM processor. **4**
3. A) What do you mean by ARM instruction set architecture ? **8**
- B) Explain Timer/counter in ARM. **6**
4. A) What are on-chip peripherals of LPC 2148 ? Describe on-chip ADC in detail. **8**
- B) Describe the pipelining of ARM microcontroller. **6**
5. A) Describe register section of the ARM core. **8**
- B) Write a note on modes of ARM processor. **6**
6. A) Draw the block diagram of ARM core and explain ALU section in detail. **8**
- B) Explain CPSR in detail. **6**
7. A) Describe the designing of ARM micro-controller based on embedded system to measure humidity. **8**
- B) Mention the salient features of LPC 2148. **6**
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M.Sc. – II (Semester – III) Examination, 2015  
Elective – I : ELECTRONICS (CGPA)  
Paper – XI : CMOS Design Technologies

Day and Date : Friday, 20-11-2015  
Time : 2.30 p.m. to 5.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. 1 and Q. 2 are **compulsory**.  
2) Solve **any three** from Q. 3 to Q. 7.  
3) Figures to the **right** indicate **full** marks.  
4) **Draw** necessary diagram and scientific calculator is **allowed**.

1. A) Choose correct alternative :

8

- 1) For n-MOS enhancement transistor the  $V_{gs}$  and  $V_t$  relation for accumulation mode is
  - a)  $V_{gs} > V_t$
  - b)  $V_{gs} = V_t$
  - c)  $V_{gs} \ll V_t$
  - d) None of these
- 2) Absolute value of threshold voltage decreases with an \_\_\_\_\_ in temperature.
  - a) Decreases
  - b) Increases
  - c) Constant
  - d) None of these
- 3) CMOS inverter acts as an amplifier in \_\_\_\_\_ region.
  - a) A
  - b) B
  - c) C
  - d) D
- 4) Width of P-device is \_\_\_\_\_ time greater than N-device.
  - a) 2
  - b) 4
  - c) 6
  - d) 8
- 5) Static power dissipation is occur due to \_\_\_\_\_
  - a) Leakage current
  - b) Switching transient current
  - c) Charging and discharging of load capacitance
  - d) None of these
- 6) For pseudo-nMOS inverter gate of the P-device is connected to
  - a) Vdd
  - b) Ground
  - c) Output
  - d) Floating



- 7) In Silicon on Insulator (SOI) \_\_\_\_\_ is used as substrate.  
a) Sapphire  
b) Magnesium aluminate spinel  
c) Silicon  
d) Both a) and b)
- 8) Minimum size of contact is \_\_\_\_\_  
a)  $2\lambda$                   b)  $3\lambda$                   c)  $4\lambda$                   d)  $5\lambda$

B) State **True** or **False** : **6**

- 1) The Components of a dataflow program are called actors.
- 2) The link does not appear in the register-transfer environment because of the connection distinctions.
- 3) The result of latchup effect is the shorting of the  $V_{DD}$  and  $V_{SS}$ .
- 4) Logic synthesis process produce netlist.
- 5) The switching speed of CMOS gate is limited by the time taken to charge and discharge the load capacitance  $C_L$ .
- 6) Photoresist material is used as mask in Fabrication Process.

2. A) Solve **any two** : **10**

- 1) Explain Noise Margin
- 2) Explain latchup
- 3) Draw a stick diagram for two input NAND gate.

B) Write a note on placement and routing. **4**

3. A) Explain DC characteristics of CMOS inverter. **8**

B) Explain Pseudo-nMOS inverter. **6**

4. A) Explain Silicon On Insulator (SOI) process. **8**

B) Write a note on  $\gamma$ -diagram. **6**

5. A) Explain power dissipation. **8**

B) Derive pull up to pull down ratio. **6**

6. A) Explain switching characteristics of CMOS. **8**

B) Draw as layout for 2 input OR gate. **6**

7. A) Explain two phase clocking strategies. **8**

B) Derive threshold voltage equation. **6**

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**M.Sc. (Part – II) (Semester – III) Examination, 2015**  
**ELECTRONICS (CGPA)**  
**Paper – XII (Elective – II) : Medical Instrumentation**

Day and Date : Monday, 23-11-2015

Total Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

- Instructions :** 1) Answer **five** questions.  
2) Question **1** and **2** are **compulsory**.  
3) Attempt **any three** from Q. **3** to Q. **7**.  
4) Figures to the **right** indicate **full** marks.

1. A) Choose correct answer.

8

- 1) Bioelectric potentials are generated at a \_\_\_\_\_ level.  
a) Chemical      b) Cellular      c) Electrical      d) Skin
- 2) The cell membrane in excited state permits the entry of \_\_\_\_\_ ions.  
a) K<sup>+</sup>      b) Cl<sup>+</sup>      c) Na<sup>+</sup>      d) P<sup>+</sup>
- 3) The \_\_\_\_\_ is the record of skeletal muscles action potential.  
a) ECG      b) EMG      c) EEG      d) PCG
- 4) The \_\_\_\_\_ wave represents repolarization of ventricles.  
a) P      b) S      c) T      d) Q
- 5) The contact impedance of floating electrode is \_\_\_\_\_ K Ohms.  
a) 60      b) 50      c) 80      d) 70
- 6) A \_\_\_\_\_ needle electrode contains both active reference electrode with in the same structure.  
a) Hypodermic      b) Earth ring  
c) Concentric core      d) Micro



- 7) The leakage current for biomedical instrumentation should not be greater than
  - a) 10 micro A
  - b) 20 micro A
  - c) 30 micro A
  - d) 50 micro A
- 8) The \_\_\_\_\_ picture is called a radiograph.
  - a) Alpha ray
  - b) X-ray
  - c) Gamma ray
  - d) Beta ray

- B) State **true** or **false**. 6
  - 1) In arteries blood flow is linear.
  - 2) In 10 – 20 EEG system there are 21 electrode locations.
  - 3) The isolation amplifier always provides the protection against leakage currents.
  - 4) Limb electrodes are generally made up of steel-silver.
  - 5) The positive potential of the cell membrane during excitation is resting potential.
  - 6) The body fluid is slightly acidic.
- 2. A) Attempt **two**. 10
  - 1) Explain the role of jellies and cream in electrical conductivity of electrode.
  - 2) Draw neat labeled cell potential diagram.
  - 3) Write the features of diagnostic X-ray.
- B) Explain Ag-Ag electrode. 4
- 3. A) Explain in detail cardiovascular system with engineering diagram. 9
- B) Write a note on EMG electrode. 5
- 4. A) Explain the general architecture of the biomedical recording system. 9
- B) Write a note on blood gas electrode. 5
- 5. A) Explain in detail modern EEG recording system. 9
- B) Explain the heart sound. 5
- 6. A) Explain the concept of resting and action potential. 9
- B) Write a note on isolation amplifier. 5
- 7. A) Explain in detail modern imaging system. 9
- B) Write a note on Nernst equation. 5



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**M.Sc. – II (Sem. – III) Examination, 2015**  
**ELECTRONICS (CGPA)**  
**Paper – XII : Elective – II : Digital Communication**

Day and Date : Monday, 23-11-2015  
Time : 2.30 p.m. to 5.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. 1 and Q. 2 are compulsory.  
2) Solve **any three** from Q. 3 to Q. 7.  
3) Figures to the **right** indicate marks.  
4) Draw necessary diagram **wherever** necessary.  
5) **Use** of scientific calculator is **allowed**.

1. A) Choose the correct alternate of the following.

8

- 1) In line coding AMI is sub coding of \_\_\_\_\_ method.  
a) biphasic      b) unipolar      c) polar      d) bipolar
- 2) In digital communication block diagram \_\_\_\_\_ is first block.  
a) digital source      b) modulator  
c) channel encoder      d) source decoder
- 3) The form of modulation used in ADSL is \_\_\_\_\_  
a) QAM      b) PSK      c) FSK      d) None of these
- 4) Modulation is used for providing an \_\_\_\_\_ transmission of the signal over the channel.  
a) efficient      b) noisi  
c) small distance      d) all of these
- 5) \_\_\_\_\_ is digital modulation technique.  
a) PM      b) AM      c) FM      d) PCM
- 6) Coding techniques can be used to \_\_\_\_\_ the error.  
a) Detect      b) Correct  
c) Both a) and b)      d) None of these
- 7) In modem the mark signal represent \_\_\_\_\_ Hz Frequency.  
a) 1070      b) 1225      c) 1010      d) 500
- 8) Shannon's sampling theorem state that \_\_\_\_\_  
a)  $F_s \leq 2F_m$       b)  $F_s \geq 2F_m$   
c) Both a) and b)      d) None of these

P.T.O.



- B) State **true** of **false**. 6
- 1) Asynchronous transmission is faster than synchronous transmission.
  - 2) FDM is used for multiplexing.
  - 3) ISDN stand for Integrated Service Domain Network.
  - 4) Low signaling rate is advantage of delta modulation.
  - 5) The center of Gravity of earth is called Geostation.
  - 6) Adaptive delta modulation reduce the slop overload distortion and granular noise.
2. A) Answer **any two** of the following. 10
- 1) Write a note on ISDN.
  - 2) Draw waveform of NRZ, RZ and AMI for 0110101.
  - 3) What is the difference between analog repeater and digital repeater ?
- B) Write a note on QAM. 4
3. A) Explain elements of digital communication technique. 8
- B) Explain telephone system. 6
4. A) Explain adaptive delta modulation. 8
- B) Explain PWM technique. 6
5. A) What is meant by Hamming Code ? Explain its structure and correct the error for 1010010. 8
- B) Explain in detail PSK modem. 6
6. A) Explain error detection technique. 8
- B) Explain power and energy of sampling signal. 6
7. A) Explain in detail Pulse code modulation. 8
- B) Explain Shannon's channel capacity theorem. 6
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**M.Sc. (Part – II) (Semester – III) Examination, 2015**  
**ELECTRONICS (CGPA)**  
**Paper – XII : (Elective – II) : CMOS Analog Circuit Design**

Day and Date : Monday, 23-11-2015  
Time : 2.30 p.m. to 5.00 p.m.

Total Marks : 70

- Instructions :** 1) Question 1 and 2 are **compulsory**.  
2) Attempt **any three** from Q. 3 to Q. 7.  
3) Figures to the **right** indicate **full** marks.  
4) **Use** of calculators/log tables are **allowed**.

1. A) Choose correct alternatives :

8

- 1) When the gate voltage reaches to threshold voltage, then substrate under the gate becomes \_\_\_\_\_  
a) saturated      b) inverted      c) quenched      d) isolated
- 2) The unit of sheet resistance is \_\_\_\_\_  
a) ohm      b) ohm/cm      c) ohm/square      d) none of these
- 3) In case of MOS transistor, the substrate must be \_\_\_\_\_  
a) Storage grounded      b) Positive  
c) Negative      d) Floating
- 4) If MOS transistor is used as switch then, the switch resistance \_\_\_\_\_  
a) decreases with gate voltage      b) increases with gate voltage  
c) always constance      d) all of these
- 5) When the gate and drain nMOS transistor are tied together, then it acts as \_\_\_\_\_  
a) Capacitor      b) MOS diode      c) Inverter      d) Active pull up
- 6) Which of the following condition should satisfy, for saturation of nMOS transistor ?  
a)  $V_{gs} = V_T$       b)  $V_{gs} > V_T$   
c)  $V_{DS} > V_{gs} - V_T$       d)  $V_{DS} < V_{gs} - V_T$
- 7) According to principle of switching capacitor the equivalent resistance is given by \_\_\_\_\_  
a)  $R = \frac{V}{I}$       b)  $R = \frac{1}{C F_s}$       c)  $R = \frac{F_s}{C}$       d)  $R = C \cdot F_s$



- 8) For active load differential amplifier \_\_\_\_\_ is used as active load.
- nMOS transistor
  - PMOS transistor
  - BiCMOS transistor
  - All of these

B) State **True** or **False** :

**6**

- The parasitic capacitance exhibit fringing effect.
- The  $\text{SiO}_2$  layer of the gate can be used form active capacitor.
- For switched capacitor circuit the clocks  $\phi_1$  and  $\phi_2$  should be in phase.
- The PMOS transistors are used for current sink.
- On saturation the drain current remains unaffected by channel length.
- The nMOS is fabricated in  $P^-$  well and PMOS is fabricated in n-well as a substrate.

2. A) Attempt **any two** of following :

**10**

- What do you mean by MOS switch ?
- Write a note on current sink.
- Describe Large-signal model of nMOS transistor.

B) Write a short note on BiCMOS transistor.

**4**

3. A) Describe current mechanism in nMOS transistor.

**8**

B) Describe in detail use of MOS transistor as a active resistor.

**6**

4. A) With block diagram describe the design of two stage operational amplifier.

**8**

B) What do you mean by reference in analog circuit ?

**6**

5. A) Derive the expression for equivalent resistance of switched capacitor circuit. Discuss series and parallel combination of capacitors.

**8**

B) Write a note of switched capacitor summing amplifier.

**6**

6. A) Describe in detail CMOS class A, source follower and push-push amplifier circuits.

**8**

B) What do you mean by differential amplifier ?

**6**

7. A) Describe a design of switched capacitor differentiator and integrator circuit.

**8**

B) What do you mean by parasitic capacitance ?

**6**

\_\_\_\_\_