**Seat No.**

## M.Sc. (Semester - I) (CBCS) Examination Mar/Apr-2018
### Electronics
## NUMERICAL METHODS

Time: 2½ hrs                                                                Max. Marks: 70

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

**Q.1  A) Choose the alternatives given below.**                            **08**

1) Laplace transform converts the function of _____.
   a) frequency domain into time domain
   b) time domain into frequency domain
   c) time domain into continuous time domain
   d) None of these

2) To obtain solution of system of linear equations, the coefficient matrix should be _____
   a) Singular                          b) Unity
   c) Non-singular                      d) All of these

3) Laplace Transform of $f(t) = t^n$ is given by F(s)=
   a) 1/S                               b) (n!)/(S)
   c) $(n!)/S^n$                        d) $(n!)/(S^{n+1})$

4) Newton's - Cotes integration formula for four points reduce to _____
   a) Simpson 1/3 rule                  b) Trapezoidal rule
   c) Simpson 3/8 rule                  d) All of these

5) Transpose of co-factor matrix is _____
   a) adjoint matrix                    b) inverse matrix
   c) sparse matrix                     d) All of these

6) For Newton's forward method of interpolation the u is given by _____
   a) $u = (x + x_n)/h$                 b) $u = (x - x_n)/h$
   c) $u = (x - x_0)/h$                 d) $u = (x + x_0)/h$

7) The divided difference method is used for the data points of _____
   a) equal interval                    b) unequal interval
   c) negative interval                 d) positive interval

8) For R-K second order method are Taylor's series can be truncated from _____
   a) $Oh^2$                            b) $Oh^3$
   c) $Oh^4$                            d) $Oh^5$

**B) State True or false.**                                                 **06**

1) Interpolation is the process of getting empirical expression from given data.
2) Numerical integration for two variables is called quadrature.
3) Laplace transformation of sinwt = $1 / (s^2 + w^2)$
4) Lagrangian method is used for interpolation of unequal spacing data points.

5) Expression for getting numerical solution of first order ordinary differential equation is derived from Taylor series.
6) In Guass Jordon elimination method the coefficient matrix should be reduced to upper triangular matrix.

**Q.2 A) Attempt any two.** 10
1) Derive expression for Laplace transformation of f(t) = sinwt.
2) Using least squares fitting process, fit following data to straight line.

| X | 1 | 3 | 5 | 7 | 9 |
|---|---|---|---|---|---|
| Y | 1.5 | 2.8 | 4.0 | 4.7 | 6.0 |

3) Solve
$x_1 + x_2 + 2x_3 = 4$
$3x_1 + x_2 - 3x_3 = -4$
$2x_1 - 3x_2 - 5x_3 = -5$

**B)** What do you mean by pivoting? 04

**Q.3 A)** What do you mean by Newton's Cotes Integration formula? Derive expression for Simpson's mid-point and one third rule for numerical integration. 08

**B)** Evaluate by using Simpson's one third method. 06

$$I = \int_0^1 X^2 dx$$

**Q.4 a)** What do you mean numerical differentiation? Derive expression for Newton's forward difference formula for numerical differentiation. 08

**b)** Find first and second order derivatives at x = 2.0 for following data point 06

| X = | 2 | 4 | 6 | 8 | 10 |
|---|---|---|---|---|---|
| Y = | 1.6 | 1.8 | 2.0 | 2.3 | 2.7 |

**Q.5 a)** What do you mean by Laplace Transformation of the given function? Describe in detail the analysis of RC circuit by using Laplace Transformation. 08

**b)** Evaluate by using composite trapezoidal rule for 10 intervals. 06

$$I = \int_0^1 e^x dx$$

**Q.6 a)** Describe formation of system of linear equations? Describe Gaussian elimination method for solution of system of linear equations. 08

**b)** Using Newton's forward difference interpolation method generates interpolating polynomial for following data points. 06

| X = | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Y = | -1 | 1 | 1 | -2 |

**Q.7 a)** Describe R-K methods of finding solution of first order ordinary differential equation. 08

**b)** Using RK - II order method find value of y(0.2) Given that 06
$\frac{dy}{dx} = 1 - y^2$ and $y(0) = 1$

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## M.Sc. (Semester - I) (CBCS) Examination Mar/Apr-2018
## Electronics
## INSTRUMENTATION DESIGN

Time: 2½ Hours                                                                 Max. Marks: 70

**Instructions:** 1) Q. (1) and (2) are compulsory.

2) Answer any three questions from Q.3 to Q.7.

3) Answer any 5 questions**.**

4) Figures to the right indicate full marks.

**Q.1  A) Choose the alternatives given below.**                          **08**

1) Gauge factor may be defined as the ratio of change in _____ with respect to the change in the length.
   - a) Length
   - b) Distance
   - c) Resistance
   - d) None of these

2) To measure rate of flow of liquid, generally, _____ is used.
   - a) Electromagnetic flow meter
   - b) Turbine flow meter
   - c) Both a and b
   - d) None of these

3) For the single channel DAS of the instrumentation an analog to digital converter _____ is recommended.
   - a) ADC 0804
   - b) ADC 09
   - c) ADC 1408
   - d) All of these

4) Which of the following features considered for selection of transducer?
   - a) Range
   - b) Accuracy
   - c) Linearity
   - d) All of these

5) The temperature coefficient of the transducer is 25m V/$^0$C, the gain of signal conditioner, if reference for ADC is 2.56 volt and range of the instrument is from zero $^0$C to 1000$^0$C, would be _____.
   - a) More than 10
   - b) less than or equal to 2
   - c) More than 100
   - d) Equal to 10

6) In case of 4 to 20mA current transmission the full scale current span is _____.
   - a) 0 to 20mA
   - b) 20mA
   - c) 16mA
   - d) 24mA

7) Which of the following is most suitable signal conditioner?
   - a) IC-2B31
   - b) IC-2B30
   - c) IC-2B35
   - d) All of these

8) For measuring instrumentation _____ stage is the essential stage.
   - a) Computing device
   - b) Current limiter
   - c) Bridge amplifier
   - d) None of these

**B) State True or false.**                                               **06**

1) For J and K type thermocouples instrumentation amplifier are needed.
2) The SY-HS-220 is the precision temperature sensor.
3) The LVDT is based on principle of magnetic induction.
4) In the ratiometric conversion the system sensitivity is independent of the reference voltage.

5) To increase the speed with which information is accurately converted, sample-hold circuits are used.
6) The resolution and accuracy of an ADC is always expressed in percentage.

**Q.2 A) Attempt any two of the following.** **10**
1) Write a note on Hall-effect.
2) Explain characteristics of 4-20mA current loop.
3) Explain isolation amplifier model 289.

**B)** Explain the techniques of measuring level of liquid. **04**

**Q.3 A)** Explain construction and working principle of LVDT. **08**
**B)** Explain with suitable circuit diagram the designing of AC bridges. **06**

**Q.4 A)** Explain the interfacing circuit for PT100 and AD590 to microcontroller. **08**
**B)** Write a note on compact data loggers. **06**

**Q.5 A)** Explain in Strain gauge and derive the expression for gauge factor. **08**
**B)** Explain signal transmission in detail. **06**

**Q.6 A)** Explain in detail I to V and V to I converter. **08**
**B)** Write a note on IR proximity sensor. **06**

**Q.7 A)** Explain in detail general block diagram of instrumentation for Measurement. **08**
**B)** With suitable diagram, describe the use of multichannel DAS. **06**

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**M.Sc. (Semester - I) (CBCS) Examination Mar/Apr-2018**
**Electronics**
**POWER ELECTRONICS**

Time: 2½ Hours                                                                 Max. Marks: 70

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

**Q.1** **A) Choose the alternatives given below.**                                          **08**

1) In three phase full converter the thristers are fired at the interval of _____ rad.
    a) $2\pi/3$                      b) $\pi/6$
    c) $\pi/3$                      d) $60^0$

2) The single phase dual converter provides the output voltage with _____. polarity.
    a) equal                      b) opposite
    c) equal but opposite        d) none of these

3) In extension angle control the displacement and power factors are _____.
    a) leading                   b) lagging
    c) equal                     d) both a & b

4) In mid-point cycloconverter the output frequency reduces in the ratio __.
    a) 5:1                       b) 1:6
    c) 1:5                       d) 6:1

5) In single phase bidirectional controller with inductive load, for power control PF angle θ must be _____ firing angle $\alpha$.
    a) greater than             b) equal to
    c) less than                d) none of these

6) The AC voltage controller have the advantage of _____
    a) power control flexibility      b) lighting control
    c) AC magnet control          d) none of thee

7) In _____ mode operation of the dual converter is same as the full converter.
    a) circulating current         b) continuous current
    c) non circulating current     d) discontinuous current

8) McMurray Bedford half bridge inverter is also called _____ commutatedinverter.
    a) voltage                   b) complementary
    c) voltage source           d) current

**B) State True or false.**                                                                          **06**

1) In three phase bridge inverter firing is delayed by $60^0$ from earlier firing.
2) The McMurray Bedford half bridge inverter is called voltage commutated voltage source inverter.
3) In PWM modulation control the lower order harmonicscan be reduced by increasing number of pulses per half cycle.

4) In single phase bidirectional controller, firing pulses of two thyristers are kept 180$^0$ apart.

5) Single phase step up cycloconverter gives the output frequency greater than input supply frequency.

6) In multiphase chopper each chopper handles a constant load current when it ON.

**Q.2** **A) Attempt any two. (Short Questions)** **10**

1) State the difference between symmetrical and asymmetrical configuration of semiconverter.

2) Write a note on single phase full wave half controlled bridge rectifier with R load.

3) Write a note on multiphase chopper.

**B)** Explain McMurryhalf bridge inverter. **04**

**Q.3** **A)** Explain operating principle of single phase bridge inverter. **07**
**B)** Write a note on integral cycloconverter. **07**

**Q.4** **A)** Explain in detail class E chopper. **07**
**B)** Explain single phase full controlled bridge rectifier with resistive load. **07**

**Q.5** **A)** With neat circuit diagram and waveform explain the McMurry fully bridge inverter. **07**
**B)** Explain in detail AC chopper. **07**

**Q.6** **A)** Explain with suitable waveform single phase unidirectional controller. **07**
**B)** Explain PWM inverters. **07**

**Q.7** **A)** Explain single phase half controlled rectifier with R-L load. **07**
**B)** Explain Microcontroller based firing schemes. **07**

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## M.Sc. (Semester - I) (CBCS) Examination Mar/Apr-2018
### Electronics
## ADVANCED MICROCONTROLLERS

Time: 2½ hrs                                                                 Max. Marks: 70

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

**Q.1** **A) Choose the alternatives given below.** 08

1) _____ of PIC 16F877 is an 8-bit timer with a prescaler and a postscaler.
   a) Timer 2                             b) Timer 3
   c) Timer 1                             d) Timer 0

2) In Pulse Width Modulation mode of PIC microcontroller, the CCPx pin produces up to a _____ resolution PWM output.
   a) 9-bit                               b) 8-bit
   c) 10-bit                              d) None of these

3) _____ register is used to configure USART of PIC 16F877 Microcontroller.
   a) TXSTA                              b) STATUS
   c) PIE1                               d) UDR

4) Each Port pin of PIC 16F877 Microcontroller sink or source _____mA.
   a) 10                                 b) 15
   c) 25                                 d) 35

5) In AVR _____ register forms 16 bit Z register.
   a) R26-R27                            b) R28-R29
   c) R30-R31                            d) None of these

6) _____ of PIC 16F877 microcontroller has a weak internal pull-up.
   a) PORTA                              b) PORTC
   c) PORTD                              d) PORTB

7) AVR atmega8 Microcontroller has _____ instructions.
   a) 95                                 b) 100
   c) 135                                d) 35

8) _____ Register is used to configure PORT of AVR as Input or Output.
   a) DDR                               b) TRIS
   c) PIN                               d) None of these

**B) State True or false.** 06

1) ADFM bit of ADMUX is used for Result Format Selection.
2) LD instruction of AVR helps to Store data in Memory from data of source memory address.
3) PORTA of AVR atmega8 has a weak internal pull up.
4) In PIC 16F877 microcontroller, If VDD falls below VBOR (4V) for longer 100µS, the brown-out situation will reset the device.
5) ADLAR of ADMUX is used to select result justification of ADC.
6) To select Bank 2 and 3 of PIC microcontroller at a time, the IRP bit of status register is set.

**Q.2** **A)** **Answer any two of the following:** 10
    1) Write note memory structure of PIC 16F877 microcontroller.
    2) Explain in detail interfacing of Optocoupler to PIC microcontroller.
    3) Compare LP and ST instructions of AVR microcontroller.

  **B)** Explain in detail DC motor controlling by using PWM techniques of PIC microcontroller. **04**

**Q.3** **a)** Write note on configuration of On-chip ADC of PIC microcontroller. **08**
    **b)** Explain in detail Watch Dog Timer of AVR atmega8. **06**

**Q.4** **a)** Explain in detail interfacing of LCD to AVR microcontroller. **08**
    **b)** Write a note on Timer 2 of PIC microcontroller. **06**

**Q.5** **a)** Write note on USART of PIC microcontroller. **08**
    **b)** Write note on Architecture of AVR atmega8 microcontroller. **06**

**Q.6** **a)** Write a note Interrupts of PIC microcontroller. **08**
    **b)** Explain firing of Relay using AVR microcontroller. **06**

**Q.7** **a)** Write note on clock and reset circuit of PIC microcontroller. **08**
    **b)** Write a note on features PIC16F877 microcontroller. **06**

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## M.Sc. (Semester - II) (CBCS) Examination Mar/Apr-2018
### Electronics
### CONTROL THEORY

Time: 2½ Hours                                                                 Max. Marks: 70

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

**Q.1** **A) Choose the alternatives given below.** **08**

1) If roots are on positive real axis of the S plane then the system said to be _____.
   a) Stable                                b) Unstable
   c) Marginally stable                     d) None of these

2) The transfer function of the circuit containing R, L and C is ___ function.
   a) Second order                          b) First order
   c) Third order                           d) None of these

3) The time that the system output takes to reach from 10 to 90% of its final value is known as _____ time.
   a) Peak time                             b) Settling time
   c) Rise time                             d) Delay time

4) In case of second order system if $\xi = 0$, then poles are ____.
   a) Purely imaginary                      b) Real and equal
   c) Real                                  d) All of these

5) If velocity error constant is Kv then steady state error for ramp input is given by $e_{ss}$ = _____
   a) Kv                                    b) 1 + Kv
   c) A/(1+Kv)                              d) A/Kv

6) For polar plots the magnitude is determined by varying gain constant K _____.
   a) From 0 to $\infty$                    b) From 0 to 1
   c) From 1 to 0                           d) From -$\infty$ to $\infty$

7) Frequency response is the response of _____.
   a) magnitude against log of frequency
   b) log of magnitude against frequency
   c) log of magnitude against log of frequency
   d) log of magnitude and phase against frequency

8) According to Angle condition the phase angle of the function G(s)H(s) is given by _____.
   a) $\angle G(s)H(s) = \pm(2q + 1)180°$        b) $\angle G(s)H(s) = \pm(2q)180°$
   c) $\angle G(s)H(s) = +(2q + 1)90°$           d) $\angle G(s)H(s) = +(2q + 3)180°$

**B) State True or false.** 06
1) The graph of log of magnitude in dB against log of frequency is called Bode Plot.
2) The standard test signal of the type step results into velocity error constant.
3) The transfer function is G(s)H(s) = 1/(s(s+5)). System is said to be second order system.
4) If the function is having single pole at origin then slope of the Bode plot is - 20dB/decade.
5) According to Hurwitz's criterion, for stable system all Hurwitz determinants should be negative.
6) PI controller is an example of discontinuous controller.

**Q.2 A) Attempt any two.** 10
1) Write a note on Poles and Zeros of the Transfer function of the system.
2) Define the term signal flow graph. State properties of signal flow graphs.
3) What do you mean by Bode Plots?
**B)** With suitable diagram describe discontinuous controllers. **04**

**Q.3 A)** What do you mean by feedback and feed forward control system? Discuss with help of suitable block diagram. **08**
**B)** What do you mean by transfer function of the system? Derive expression for transfer function of the system consisting R and C connected in series and output is taken across Capacitor. **06**

**Q.4 A)** Define the terms transient response and steady state response. Discuss specification of the transient response. **08**
**B)** Discuss transient response of first order system with unit step input. Represent poles of closed loop transfer function in s-plane. **06**

**Q.5 A)** What do you mean by frequency response? Explain with suitable examples. **08**
**B)** What do you mean by Routh-Hurwitz Criteria for stability? **06**

**Q.6 A)** What is need of block diagram reduction? Explain in detail the rules used for block diagram reduction. **08**
**B)** Using standard rule reduce following block diagram. **06**
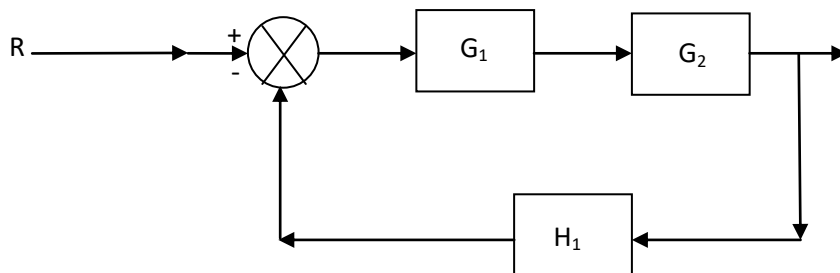


**Q.7 A)** Describe in detail the concept of Polar plots. Draw polar plot for the function G(jw)H(jw) = 10/jw **08**
**B)** What is concept of composite control mode? Discuss PID mode in detail. **06**

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## M.Sc. (Semester - II) (CBCS) Examination Mar/Apr-2018
### Electronics
### REAL TIME OPERATING SYSTEM

Time: 2½ Hours                                                             Max. Marks: 70

**Instructions:** 1) Q. (1) and (2) are compulsory.
2) Answer any three questions from Q.3 to Q.7.
3) Answer any 5 questions.
4) Figures to the right indicate full marks.

**Q.1  A) Choose the alternatives given below.**                          **08**

1) The API stands for _____.
   a) Application Programming Interface
   b) Application Process Interface
   c) Application Programming Interchange
   d) none of these

2) For real time operating systems, interrupt latency should be _____.
   a) Minimal                          b) Maximum
   c) Zero                             d) Dependent on the scheduling

3) The problem of priority inversion can be solved by _____.
   a) Priority inheritance protocol    b) Priority inversion protocol
   c) Both a and b                     d) None of these

4) A task is said to be in Ready to Run state, if it is waiting in a queue for the _____ time.
   a) CPU                              b) Kernel
   c) Object                           d) None of these

5) In Preemptive multitasking the _____ priority task is always given the CPU time.
   a) Highest                          b) Lowest
   c) Equal                            d) None of these

6) Releasing binary or counting semaphores results in ____ the value or count.
   a) Incrementing                     b) Decrementing
   c) Equivalent to                    d) None of these

7) Binary semaphore will take the value of _____.
   a) one                              b) zero
   c) either zero or one               d) none of these

8) A task post the message queue and another tasks will read the message _____ Kernel object is used.
   a) Mailbox                          b) Message queue
   c) Mutex                            d) All of these

**B) State True or false.**                                               **06**

1) In real time operating system a task must be serviced by its deadline period.
2) The time slice allocated to each task is called quantum.
3) Mutex stand for mutual exclusion.

4) A real time system consists of a number of tasks.
5) Acquiring a binary or counting semaphores result in incrementing the value or count.
6) Deadlock occurs when two or more tasks wait for resource being held by another task.

**Q.2** **A) Attempt any two of the following.** **10**
1) What do you mean by Concept of Real Operating System?
2) Write note on priority based preemptive scheduling.
3) Write note on POSIX Pthreads.

**B)** Explain in detail characteristics of embedded system. **04**

**Q.3** **A)** Explain in detail concept of semaphore. **08**
**B)** Write note on RTOS Kernel object; Messages. **06**

**Q.4** **A)** Compare Hard and Soft real time operating system. **08**
**B)** Write a note on task and task structure. **06**

**Q.5** **A)** Design AVR ATmega8L microcontroller based embedded systems for Measurement of Humidity. **08**
**B)** Write Simple programs based on RTOS for LED interfacing. **06**

**Q.6** **A)** What do you mean by Sharing of resources and context switching? **08**
**B)** Write note on Minimum requirement of Microcontroller based embedded system with suitable diagram. **06**

**Q.7** **A)** Explain in detail RTLinux Kernel. **08**
**B)** Explain services of Scheduler. **06**

## M.Sc. (Semester - II) (CBCS) Examination Mar/Apr-2018
### Electronics
### OPTO ELECTRONICS

Time: 2½ Hours                                                                    Max. Marks: 70

**Instructions:** 1) Q. 1 and 2 are compulsory.
          2) Answer any three questions from Q.3 to Q.7.
          3) Answer any 5 questions**.**
          4) Figures to the right indicate full marks.

**Q.1**   **A) Choose the alternatives given below.**                                **08**

1) Critical angle $\theta C$ = _____
   a) $N_2/N_1$                                b) $\sin^{-1}(N_2/N_1)$
   c) $(N_1-/N_2)/N_1$                     d) $N_1/N_2$

2) In _____ fibers the refractive index of the core is maximum at the centre.
   a) Single mode step index         b) Multimode step index
   c) Graded index                      d) both a and b

3) In surface emitters, the emission pattern is _____.
   a) Isotropic                          b) Anisotropic
   c) Isolateral                        d) none of these

4) In Helium-Neon laser the light is produced by atomic transition within ____ atom.
   a) Neon                            b) Helium
   c) Helium and Neon               d) none of these

5) _____ shifts the polarization direction of linearly polarized light.
   a) Quarter wave plate          b) Half wave plate
   c) Retarder                    d) None of these

6) _____ is magneto optic phenomena.
   a) Faraday's effect             b) Pockel's effect
   c) Malus's law                 d) None of these

7) _____ material exhibits linear electro-optic effect.
   a) Crystalline silica          b) Non-centro symmetric
   c) Both a & b                  d) none of these

8) Acceptance angle for optical fiber having core index 1.48 and cladding index 1.39 is _____.
   a) $45.44^0$                         b) $49.60^0$
   c) $33.90^0$                       d) $120^0$

   **B) State True or false.**                                                                **06**
1) Optical fibers are good electron conductors.
2) Second order electro optic effect is called Pockel's effect.
3) In incoherent source of light optical cavity is absent.
4) In silica fiber 1400nm is a high loss region.
5) Positive uniaxial crystal is used to construct the wave plats.
6) Splicing means permanent fiber joints.

**Q.2** **A) Attempt any two of the following.** **10**
    1) Write a note on Edge emitting LED.
    2) With suitable ray diagram, explain working principle of optical fiber.
    3) Write a note on Photo transistor.

    **B)** With suitable diagram, explain the concept of population inversion. **04**

**Q.3** **A)** What is optical fiber communication? Explain the types of optical fiber in detail. **08**
    **B)** Write a note on P-I-N photodiode. **06**

**Q.4** **A)** Explain the principle of photo detection and give the construction and working of Avalanche photodiode. **08**
    **B)** Derive expression for Numerical Aperture. **06**

**Q.5** **A)** What do you mean by light intensity modulation? Describe in detail phenomenon of Birefringence. **08**
    **B)** Write a note on Faraday's effect. **06**

**Q.6** **A)** With necessary diagram, explain splicing technique in brief. **08**
    **B)** Write a note on any two types of fiber measurement. **06**

**Q.7** **A)** What do you mean by Acoustic Optic Modulator? **08**
    **B)** Write a note on Quarter wave plate. **06**

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## M.Sc. (Semester - III) (New) (CBCS) Examination Mar/Apr-2018
### Electronics
### DIGITAL SIGNAL PROCESSING

Time: 2½ Hours                                                                          Max. Marks: 70

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

**Q.1  A) Choose the alternatives given below.**                                    **08**

1) If x(n) is causal sequence then its initial value is _____.
   a) $x(0) = \lim_{z \to \infty} X(Z)$           b) $x(0) = \lim_{z \to 0} X(Z)$
   c) $x(\infty) = \lim_{z \to 1} X(Z)$           d) $x(\infty) = \lim_{z \to 1} X(Z)\,(1 - Z^{-1})$

2) If x(n) is causal sequence then ROC is _____ .
   a) Interior part of circle of radius $\alpha$
   b) Exterior part of circle of radius $\alpha$
   c) Intersection of two circles of radii $\alpha$ & $\beta$
   d) Entire Z plane except $|Z| = 0$ & $|Z| = \infty$

3) The low pass butterworth filter provides the magnitude response is nearly _____
   a) Constant at lower frequency       b) equal to 1 at lower frequency
   c) constant at higher frequency      d) both a and b

4) In the Z plane if pole is outside the unit circle then _____
   a) The amplitude of the signal is increasing
   b) The amplitude of the signal is decreasing
   c) The amplitude of the signal is fixed amplitude
   d) signal alters the sign

5) The modulation property of Fourier Transform $F\{x(t)e^{j\omega t}\}$ is _____.
   a) $X(\omega - \omega_0)$                b) $X(t - t_0)$
   c) $e^{j\omega t}X(\omega)$              d) $j\omega\,X(\omega)$

6) The impulse invariance method is not suitable to design _____
   a) low pass filter                   b) high pass filter
   c) band pass filter                  d) digital filter

7) The necessary condition for x(t) to have fourier transform are _____
   a) x(t) has finite number of discontinuities
   b) x(t) is absolutely integrable over $(-\infty, +\infty)$
   c) x(t) has finite number of maxima and minima in every finite interval.
   d) all above

8) Z-transform of delayed unit impulse signal is _____.
   a) $Z^K$                             b) $Z^{-k}$
   c) 1                                 d) none of these

**B) State True or false.** 06
1) The digital filter is stable if the poles are inside the unit circle in Z domain.
2) There is no aliasing effect in bilinear transformation.
3) Inverse fourier transform of $\delta(\omega)$ is 1
4) The circular frequency shift property of DFT is also called Quadrature Modulation theorem.
5) Because of the non-linear mapping the amplitude response of digital IIR filter is expanded at higher frequencies and compressed at lower frequencies.
6) Auto-correlation is denoted by $r_{xy}(1)$

**Q.2** **A) Attempt any two.** 10
1) Find the Fourier Transform of signum function.
2) Explain the relationship between Z Transform and Fourier Transform.
3) With block diagram, explain the process of analog to digital conversion.
**B)** What is FFT? Explain Radix- 2FFT algorithm. 04

**Q.3** **A)** State and prove that complex conjugate property of DFT. 08
**B)** Use the four point of DFT and IDFT to determine the circular convolution of sequences. 06
$x_1(n) = \{1, 2, 3, 1\}$ and $x_2(n) = \{4, 3, 2, 2\}$

**Q.4** **A)** Compute the DFT of sequence $x(n) = \cos n\pi/2$, where N=4. Using DIF FFT algorithm. 08
**B)** Find the Z transform and sketch ROC for following sequence 06
$x[n] = 2^n u[n] + 3^n u[-n-1]$

**Q.5** **A)** Determine the sequence $x(n)$ associated Z Transform given below using partial fraction expansion method 08
$X[Z] = (4Z^2 – 2Z)/(Z^3 – 5Z^2 + 8Z – 4)$; Right sided sequence
**B)** State and prove final value theorem of z-transform 06

**Q.6** **A)** Find out H(Z) using impulse invariance method at 5 Hz sampling frequency from H(S) as given by H(S) = 2/(S+1)(S+2) 08
**B) Write a note on:** 06
1) FIR filter design using Kaiser window
2) Bilinear transformation for IIR filter design

**Q.7** **A)** State and prove time differentiation property of Fourier transform. 08
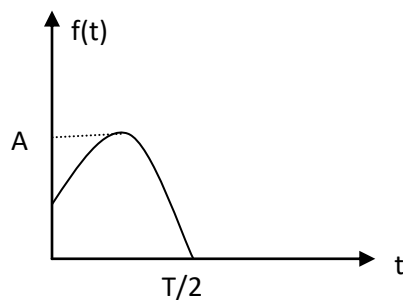**B)** Find the Fourier transform of sinusoidal pulse shown in figure 1 06



Figure 1

| Seat No. | |
|---|---|

## M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
### Electronics
## MICROWAVE DEVICES, ANTENNAS AND MEASUREMENTS

Time: 2 ½ hrs          Max. Marks: 70

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

**Q.1 A) Choose the alternatives given below.**        **08**

1) The correct sequence of frequency bands in order of increasing available peak power is _____.
   a) C –band, X –band, L –band, S –band
   b) X –band, C –band, S –band, L –band
   c) X –band, S –band, C –band, L –band
   d) S –band, X –band, C –band, L –band

2) Which one of the following is correct?
   a) $\nabla \times \vec{j} + \frac{\partial \rho}{\partial t} = 0$         b) $\nabla \times \vec{j} + \frac{\partial \rho^2}{\partial t^2} = 0$
   c) $\nabla . \vec{j} + \frac{\partial \rho}{\partial t} = 0$          d) $\nabla . \vec{j} + \frac{\partial \rho^2}{\partial t^2} = 0$

3) The input impedance of short circuited lossless line of length less than a quarter wavelength is _____
   a) purely resistive           b) purely inductive
   c) purely capacitive         d) complex

4) In hallow rectangular waveguide, the phase velocity _____
   a) increases with increasing frequency
   b) decreases with increasing frequency
   c) is independent of frequency
   d) will vary with frequency depending upon the frequency range

5) Rectangular wave guide will not be supported _____ modes of transmission.
   a) $TE_{10}$             b) $TE_{11}$
   c) $TM_{11}$            d) $TM_{10}$

6) In lossless line $R_L < Z_0$ then _____
   a) Reflection coefficient is 0
   b) Reflection coefficient is ∞
   c) Reflection coefficient is negative
   d) Reflection coefficient is positive

7) In $\pi$ mode operation of magnetron, the spokes due to phase focusing effect rotate at an angular velocity corresponding to _____.
   a) one pole / cycle          b) two pole / cycle
   c) four poles / cycle         d) six poles / cycle

8) The reflection coefficient on a line is $0.2 \angle 45^0$. The SWR is _____.
   a) 0.8              b) 1.1
   c) 1.5             d) 1.2

**B) State True or false.** 06

1) Dipole antenna is most commonly used for TV broadcasting in the UHF band.
2) The presence of slot on the waveguide doesn't change the boundary conditions.
3) Displacement current only exists when the electric field is time-varying.
4) Slow-wave structures are special circuits that are used in microwave tubes to reduce the wave velocity in a certain direction.
5) IMPATT diode is transferred electron device?
6) In microwave power measurement using bolometers, the principle of working is the variation of resistance with absorption of power.

**Q.2** **A) Attempt any two.** 10

1) What is impedance matching? Explain various methods of achieving impedance matching?
2) Write a detail note on corners, bends and twists of waveguide.
3) Write a note on microwave frequency spectrum.

**B)** Explain the fundamental difference between Waveguide and TEDs? **04**

**Q.3** **A)** Explain the process of velocity modulation and bunching a reflect klystron oscillator with the help of applegate diagram. **08**

**B)** Derive Maxwell's equations in derivative and integral form. **06**

**Q.4** **A)** A transmission line has the following parameters. **08**
R = 2 Ω/m     G = 0.5 m℧   f = 1GHz     L = 8nH/m   c = 0.23pF
Calculate:1) the characteristics impedance;
                2) the propagation constant

**B)** Explain the double minimum method of measurement of VSWR. **06**

**Q.5** **A)** Explain operation of E-H plane Tee junction and derive the scattering matrix of it. **08**

**B)** Explain Horn antenna in detail. **06**

**Q.6** **A)** What is directional coupler? Describe various types of directional coupler. **08**
**B)** Explain briefly :  1) Reflection coefficient **06**
                   2) Transmission coefficient

**Q.7** **A)** Briefly explain RWH theory. **08**
**B)** With schematic diagrams, explain Wave Polarization. **06**

Seat No.

**M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018**
**Electronics**
**NETWORKING AND DATA COMMUNICATIONS**

Time: 2½ Hours                                                                          Max. Marks: 70

**Instructions:** 1) Q. (1) and (2) are compulsory.
               2) Answer any three questions from Q.3 to Q.7.
               3) Answer any 5 questions.
               4) Figures to the right indicate full marks.

**Q.1** **A) Choose the alternatives given below.**                                         08
    1) The RG-58 is used for _____ ethernet.
      a) thick                           b) thin
      c) wireless                 d) none of these

    2) The reply of the Address Resolution Protocol is _____.
      a) broadcast                b) unicast
      c) multicast                d) all of these

    3) In IPv4 addressing, x.y.z.t/n, the /n is defined for _____.
      a) masking                b) addressing
      c) encoding               d) decoding

    4) IP is an unreliable and _____ data gram protocol.
      a) connection oriented       b) connectionless
      c) both a & b               d) None of these

    5) The _____ layer has his sub-layer as Media Access Control (MAC).
      a) physical                b) network
      c) presentation           d) data link

    6) The encoding technique, Differential Manchester, has the idea of _____.
      a) RZ & NRZ-I           b) RZ & NRZ-L
      c) NRZ & NRZ-I         d) NRZ & NRZ-L

    7) The TDD-TDMA is a _____ type of communication.
      a) full duplex             b) duplex
      c) half duplex           d) simplex

    8) The TDP and UDP are _____ layer protocols.
      a) physical                b) transport
      c) presentation           d) session

**B) State True or false.**                                                                  06
    1) The 68:21:D2:01:2E:4B is unicast address.
    2) The HDB3 substitutes eight consecutive zeros with 000VB0VB.
    3) The BSS without an AP is called an Ad-Hoc network.
    4) The repeater has filtering capabilities.
    5) The L2CAP provides Multiplexing, Segmentation and reassembly and QoS.
    6) The ADM in the network performs insertion and extraction of signals.

**Q.2** **A)** **Attempt any two of the following.** **10**
      1) Explain repeater and routers.
      2) Explain the IPv4 protocol.
      3) Explain Bridge Ethernet and Switched Ethernet.

    **B)** Discuss circuit switched network. **04**

**Q.3** **A)** Explain in detail IPv6 addressing. **09**
    **B)** Discuss the SONET. **05**

**Q.4** **A)** Discuss the OSI model. **09**
    **B)** Discuss standard Modem. **05**

**Q.5** **A)** Explain ATM technology. **09**
    **B)** Discuss the connecting devices. **05**

**Q.6** **A)** Explain the different multiplexing techniques to improve the efficiency of the channel. **09**
    **B)** Explain the frequency hopping spread spectrum technique. **05**

**Q.7** **A)** Explain role of cryptography in networking. **09**
    **B)** Explain the multicast routing protocol. **05**

**Seat No.**

## M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
### Electronics
### NANOELECTRONICS

Time: 2½ Hours　　　　　　　　　　　　　　　　　　　Max. Marks: 70

**Instructions:** 1) Q. 1 and 2 are compulsory.
　　　　　　　　2) Answer any three questions from Q.3 to Q.7
　　　　　　　　3) Answer any 5 questions.
　　　　　　　　4) Figures to the right indicate full marks.

**Q.1　A) Choose the alternatives given below.　　　　　　　　08**

1) The MBE technique is important for fabrication of ____ DEG system.
　　a) 2　　　　　　　　　　　　　b) 1
　　c) 0　　　　　　　　　　　　　d) 3

2) The operation of negative differential resistor (NDR) quantum well electron device is based on _____
　　a) quantum confined stark effect　　b) resonant tunnel effect
　　c) both a & b　　　　　　　　　　　d) none of these

3) The transistor based on hot electron is called _____ transistor.
　　a) hot hole　　　　　　　　　　　b) hot
　　c) hot electron　　　　　　　　　d) electron

4) The triangular well wave functions are ____ due to the asymmetry of the potential well.
　　a) neither symmetric or antisymmetric
　　b) symmetric
　　c) neither asymmetric or antisymmetric
　　d) antisymmetric

5) The SiGe heterojunctions have _____ lattice constant difference between Si and Ge, which is about 4%.
　　a) small　　　　　　　　　　　　b) large
　　c) equal　　　　　　　　　　　　d) none of these

6) The superlattice consists of a ___ set of Multiple Quantum Well (MQW).
　　a) periodic　　　　　　　　　　　b) regular
　　c) irregular　　　　　　　　　　　d) none of these

7) The OLED's are an electroluminescent organic material between two _____ of different work functions.
　　a) semiconductors　　　　　　　b) nonconductors
　　c) insulator　　　　　　　　　　d) conductors

8) The triangular well is effectively _____ DES system.
　　a) zero　　　　　　　　　　　　b) two
　　c) one　　　　　　　　　　　　d) three

**B) State True or false.** 06

1) The zero DEG structure is often called as artificial atoms.
2) The organic semiconductor has $\pi$ and $\sigma$ bonds.
3) The homo-structures are made from the same material with non-uniform doping.
4) The motion of particle in the nanoworld is determined by wave and quantum mechanics.
5) If $\lambda > L_x, L_y$ and $L_x, L_y << L_z$ then it stands for quantum well.
6) The particle moves throughout the structure without scattering is called diffusive regime of particle.

**Q.2 A) Attempt any two of the following.** 10

1) Explain the quantum well, wire and dots in brief considering the lengths.
2) Discuss advantages of the nanostructures.
3) Discuss in brief nanotechnology and nanoelectronics.

**B)** Explain the quantum dots with DOS diagram. 04

**Q.3 A)** What do you mean by MOSFET structures? 09
**B)** Write a note on quantum wire. 05

**Q.4 A)** Explain in detail Heterojunctions. 09
**B)** Write on nanoimprint lithography. 05

**Q.5 A)** Explain the parabolic and triangular quantum well. 09
**B)** Write a note on Coulomb Blockade. 05

**Q.6 A)** Explain the concept of superlattice and discuss the Kronig-Penney model of superlattice. 09
**B)** Write a note on any three characteristics length in nanostructures. 05

**Q.7 A)** Explain in detail tunneling effect and tunneling elements. 09
**B)** Write a note on OLED. 05

**Seat No.**

## M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
### Electronics
## MECHATRONICS AND INDUSTRIAL AUTOMATION

Time: 2½ Hours                                               Max. Marks: 70

**Instructions:** 1) Q. (1) and (2) are compulsory.
2) Answer any three questions from Q.3 to Q.7
3) Answer any 5 questions.
4) Figures to the right indicate full marks.

**Q.1    A) Choose the alternatives given below.**                          **08**

1) The number of input resisters in PLCs is normally _____ of holding Register.
   a) One tenth              b) One fourth
   c) Equal                  d) None of these

2) MCR stands for _____.
   a) Master Control Relay      b) Master Controller Relay
   c) Master Contact Relay      d) None of these

3) _____ is advantage of PLC.
   a) Flexibility            b) Low cost
   c) Security               d) All of these

4) In PLC arithmetic subtraction operation, if result is negative the result resister, it turns _____ coil.
   a) OFF                    b) ON
   c) Blinking               d) None of these

5) In normally _____ contact, when this contact close, the function carries out some kind of action.
   a) Open                   b) Close
   c) Latch                  d) None of these

6) A single input timer is called a _____ timer.
   a) retentive              b) Nonretentive
   c) Both a) and b)         d) None of these

7) RTU stands for _____
   a) Remote Terminal Unit      b) Real Terminal Unit
   c) Remote Transmitter Unit   d) All of these

8) _____ determines which rack the module sits in.
   a) Rack number            b) Terminal number
   c) Both a) and b)         d) None of these

**B) State True or false.**                          **06**

1) The PLC sequential function is often called the cube function.
2) Visual observation is advantage of PLC.
3) PROFIBUS PA is used for Process Automation.
4) The PLC sequential function is often called the drum controller function.
5) First Generation SCADA system known as distributed SCADA system.
6) In PLC ladder diagram, the MCR terns the following specified number of lines to the OFF state.

**Q.2** **A)** **Attempt any two of the following.** **10**
    1) Explain Profibus in detail.
    2) Explain in detail about remote terminal unit (RTU).
    3) Define Real time mechatronic system.

    **B)** Explain design process of mechatronic system. **04**

**Q.3** **A)** Explain in detail introduction to Mechatronic system and applications of mechatronic systems. **08**
    **B)** Write note on Timer Function of PLC. **06**

**Q.4** **A)** Discuss Modeling of measurement system. **08**
    **B)** Explain in detail architecture of CCS system. **06**

**Q.5** **A)** Explain Concept of programming of the PLC with suitable example. **08**
    **B)** Write note on advantages and disadvantages of mechatronics systems. **06**

**Q.6** **A)** Write note on Supervisory Control and Data Acquisition system. **08**
    **B)** Discuss different PLC instructions. **06**

**Q.7** **A)** Explain in detail Architecture of Programmable Logic Controller. **08**
    **B)** Explain addition and subtraction functions of PLC. **06**

**Seat No.**

## M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
### Electronics
### WIRELESS SENSOR NETWORK

Time: 2½ Hours                                                        Max. Marks: 70

**Instructions:** 1) Q. (1) and (2) are compulsory.
2) Answer any three questions from Q.3 to Q.7
3) Answer any 5 questions**.**
4) Figures to the right indicate full marks.

**Q.1** **A) Choose the alternatives given below.**                          **08**

1) Category 2, C2WSN, of Wireless Sensor Network utilizes _____ Routing.
   a) Dynamic                    b) Static
   c) Multihop                   d) None of these

2) As per the IEEE 802.15.4 standard, total _____ channels are made available for Wireless Communication.
   a) 20                         b) 25
   c) 21                         d) 27

3) The IEEE designation for Wireless LAN is _____.
   a) 802.15                     b) 802.2
   c) 802.11                     d) 802.16

4) In _____ topology there is a central controller or hub.
   a) Star                       b) Mesh
   c) Ring                       d) Bus

5) _____ is Reduced Function Device.
   a) Coordinator                b) Router
   c) End Device                 d) Both a) and b)

6) _____ layer having the availability of an optional super frame structure.
   a) PHY                        b) MAC
   c) Application                d) Transport

7) In PEGASIS, final aggregation of data is given to _____.
   a) Chain leader               b) Cluster head
   c) End device                 d) None of these

8) In ISM band, the frequency band 868.3 MHz having _____ data rate.
   a) 20 kbps                    b) 40 kbps
   c) 20 Mbps                    d) 250 kbps

**B) State True or false.**                                              **06**
1) Wireless Sensor Nodes are not autonomous devices.
2) In Wireless Sensor Network protocol stack, the task management plane, detects and registers movements of nodes.
3) In WSN, each Wireless Sensor Node has its own ID.
4) By default, Zigbee operates in Transparent Mode.
5) In PEGASIS is the suitable example of adaptive routing.
6) Every RF data packet sent over-the-air contains a Source Address and Destination Address field in its header.

**Q.2** **a)** **Attempt any two of the following.** 10
  1) Write a note on standard Wireless Sensor Nodes.
  2) Explain protocol stack for Wireless Sensor Network.
  3) What do you mean by energy management in Wireless Sensor Network?

**b)** Mention the different features of Zigbee. 04

**Q.3** **a)** With suitable block diagram, explain the architecture of Wireless Sensor Node. Describe the classification of Wireless Sensor Nodes. 08
**b)** Briefly explain the characteristics of Wireless Sensor Network. 06

**Q.4** **a)** What do you mean by Wireless Sensor Network? With suitable diagram describe types of WSN. 08
**b)** Give comparative discussion on functionalities of the sensor nodes. 06

**Q.5** **a)** Design the Wireless Sensor Network for agriculture applications using Zigbee module and AVR microcontroller. 08
**b)** Explain the standard IEEE 802.15.4. 06

**Q.6** **a)** With pin description give architecture of the Zigbee device. Explain API and Transparent modes of the Zigbee device. 08
**b)** Write a note on network topologies. 06

**Q.7** **a)** What do you mean by hierarchical architecture of Wireless Sensor Network? Describe in detail the function of the LEACH protocol. 08
**b)** Explain the applications of Wireless Sensor Networks in details. 06

**Seat No.**

## M.Sc. (Semester - IV) (New) (CBCS) Examination Mar/Apr-2018
## Electronics
## MIXED SIGNAL BASED SOC DESIGN

Time: 2½ Hours                                                             Max. Marks: 70

**Instructions:** 1) Q. (1) and (2) are compulsory.
2) Answer any three questions from Q.3 to Q.7
3) Answer any 5 questions**.**
4) Figures to the right indicate full marks.

**Q.1** **A) Choose the alternatives given below.** 08

1) The PSoC1 device from Cypress comprises an array of _____ programmable analog blocks.
   a) 12                              b) 16
   c) 24                              d) 4

2) The Internal main oscillator of PSoC1 device has _____ frequency.
   a) 32.768 KHz                    b) 732 KHz
   c) 24 MHz                         d) 12 MHz

3) In $\Delta\Sigma$ ADC the quantization error is given by _____
   a) $2\Delta$                         b) $\Delta$
   c) $\Delta/2$                        d) None of these

4) The global IO ports can be configured in _____ modes.
   a) 2                               b) 4
   c) 6                               d) 8

5) In continuous time analog block of PSoC devices the gain can be configured up to _____
   a) 2                               b) 256
   c) 8                               d) 48

6) In case of switched capacitor programmable analog blocks the clocks should be _____.
   a) Out of phase with same frequency
   b) In phase with different frequency
   c) In phase with same frequency
   d) All of these

7) In switched capacitor inverting amplifier, the gain is given by A = _____.
   a) $C_A/C_F$                       b) $C_F/C_A$
   c) $R_F/F_A$                       d) $C_A \times C_F$

8) The PSoC devices are having _____ mA current sinking capacity per pin.
   a) 25mA                           b) 10mA
   c) 20mA                           d) 15mA

**B) State True or False.** **06**
   1) As per the hardware configurability, the global odd numbered buses are interfaced with global odd numbered ports only.
   2) In PSoC 1, each memory page of flash is of 1K bytes.
   3) Continuous time analog block cannot be configured as instrumentation amplifier.
   4) For delta sigma ADC the decimator block is essential.
   5) The clocks used to ensure the switched capacitor analog components should be in phase.
   6) In case of Cypress PSoC 5, the 8051 core is used for processing.

**Q.2 A) Attempt any two of the following.** **10**
   1) With block diagram, describe the general architecture of PSoC devices.
   2) Write a note on global IO ports and their configuration.
   3) Based on SC principle, describe the design of difference amplifier.

**B)** With block diagram, describe an array of programmable analog block. **04**

**Q.3 A)** Describe the basic principal of Delta Sigma ADC. **08**
   With suitable diagram describe an architecture of Delta Sigma ADC of PSoC device.
**B)** Describe in details an architecture of system bus of PSoC1 devices. **06**

**Q.4 A)** With the suitable block diagram describe an array of programmable digital blocks. Discuss fundamental architecture of programmable digital block. **08**
**B)** Describe in detail programmable UART block of PSoC device. **06**

**Q.5 A)** What do you mean by mixed signal based SoC design? **08**
   Discuss the salient features of Cypress programmable system on Chip.
**B)** With suitable diagram, describe in detail configuration of digital block as a timer. **06**

**Q.6 A)** What is Nyquist theorem for sampling? Describe with suitable block diagram general architecture of $\Delta\Sigma$ ADC. **08**
**B)** With suitable block diagram, describe the design of mixed signal based system on chip for measurement of relative humidity. **06**

**Q.7 A)** What are subsystems of PSoC1 device? Describe in detail Clock system of the PSoC devices. **08**
**B)** Write a note on interrupt subsystem. **06**