FACULTY OF ENGINEERING

B.E. 4/4 (Common to All) I-Semester (New) (Main) Examination, December 2013

Subject : Entrepreneurship
(Electives - I)

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. What is meant by intrapreneur? How in an intrapreneur different from an entrepreneur?
2. Give different concepts of entrepreneurs.
3. State the significance of collaborative interaction for technology development.
4. What do you understand by marketing mix?
5. Define a project report.
6. Distinguish between PERT and CPM.
7. What is working capital?
8. What is selective control of inventory ? Why is it needed?
9. How is a project formulated?
10. What is microenterprise?

PART – B (50 Marks)

11. Explain linkages between small, medium and large industries.

12.(a) Explain about first generation entrepreneur.
   (b) Explain about women entrepreneur.

13.(a) Write an essay on the growth of entrepreneurship in India.
   (b) How are Competence, Opportunities and Challenges related to each other?

14. What do you understand by project identification? Discuss with examples, the process involved in project identification.

15.(a) How is a project formulated? Give an overview.
   (b) What do you understand by project appraisal ? Why it is done?

16.(a) What are various factors motivating people to become entrepreneurs?
   (b) Discuss the advantages and limitations of PERT and CPM with suitable examples.

17. Write short notes on the following:
   (a) Technical Feasibility
   (b) Market Assessment
   (c) Working Capital

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FACULTY OF ENGINEERING

B.E. 4/4 I – Semester (Old) Examination, December 2013

Subject: Entrepreneurship (Elective – I)

Time: 3 Hours   **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1. Enumerate at least three advantages of SSI units over large units.

2. List the advantages and disadvantages of Private Limited Company over 'Sole Trader'.

3. Explain the factors to be considered while deciding on the choice of technology.

4. What is break-even analysis? Explain its use in financial analysis of a project.

5. What are the sources of short-term funds?

6. How do you carry out business opportunity survey?

7. When do you use PERT? Give two examples.

8. Explain any two qualities of Leadership.

9. Describe the need for achievement, need for affiliation and need for power.

10. What is working capital? How do you estimate if?

PART – B (50 Marks)

11. (a) Define leadership. Justify the statement "The essence of leadership is followership".
    (b) What are the theories of leadership? Explain.

12. What Time Management Techniques are available that ensure a project being completed on time.

13. (a) Bring out the relationship between economic growth and entrepreneurship.
    (b) What is CPM? Explain its use in planning a project execution for a SSI.

14. (a) What are the risks faced and rewards gained by entrepreneurs while setting up a SSI?
    (b) What is business opportunity survey? Explain how do you carryout the same.

15. (a) What are the problems and risks faced by women entrepreneurs?
    (b) What is margin money? What are the sources of finance for starting a SSI?

16. What are the issues considered in Technical and Financial analysis of a project? Explain how you will carryout the same.

17. For any project known to you, show a detailed project report.

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I – Semester (New) (Main) Examination, December 2013

Subject: Optical Fiber Communication (Elective – I)

Time: 3 Hours   Max.Marks: 75

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1. Draw the Schematic of a single – fiber structure and explain it. (3)
2. Calculate the numerical aperture of a step-index fiber having n_1= .48 and n_2= 1.46. What is the maximum entrance angle $\theta_{o,max}$ for this fiber if the outer medium is air with n=1.00? (2)
3. An optical signal at a specific wavelength has lost 55 percent of its power after traversing 3.5 km of fiber. What is the attenuation in dB/Km of this fiber? (3)
4. What is the significance of group delay? (2)
5. Bring out the differences between LED and Lasers. (3)
6. List out various direct and indirect band gap materials. (2)
7. Explain about Avalanche multiplication noise. (2)
8. What is the basic principle involved in photo detectors. (3)
9. What do you understand by transmission distance for single-mode links? (3)
10. How does modal noise arises? (2)

PART – B (50 Marks)

11. (a) With a neat block diagram, explain the operation of an optical fiber transmission link. (6)
    (b) Discuss in detail about mode theory of circular wave guides. (4)

12. (a) What are the two main causes of intramodal dispersion and explain about them. (4)
    (b) Explain about the mode-coupling effects on pulse distortion in long fibers for various coupling losses. (6)

13. (a) Discuss in details about the temperature effects with respect to laser diode. (5)
    (b) Explain in detail about various types of fiber-to-fiber joints. (5)

14. (a) Explain about the Digital Signal Transmission with a neat diagram of a typical digital fiber transmission link. (5)
    (b) What is the need of preamplifier and explain about its different types. (5)

15. (a) Describe the significance of link power budget and rise-time budget. (5)
    (b) Discuss about the transmission formats and speeds with regards to SONET/SDH. (5)

16. (a) Discuss in detail about the evolution of fiber optic system. (5)
    (b) Explain the phenomenon of linearly polarized modes. (5)

17. Write short note on: (10)
    a) Wave guide dispersion
    b) WDM.

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I-Semester (Old) Examination, December 2013

Subject : Optical Fiber Communication
(Electives - I)

Time : 3 Hours   Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Define Meridional rays, skew rays and numerical aperture.
2. Compare between step index and graded index fiber.
3. What is the significance of Numerical aperture?
4. What are the advantages of LASERS OVER LED?
5. How mode coupling is done?
6. What is the difference between gain guided laser diode and index guided laser diode?
7. What is the need of double hetrojunction structure?
8. What are the advantages of APD over PIN photo diode?
9. What are the different error sources in optical communication system?
10. How WDM is different from FDM?

PART – B (50 Marks)

11.(a) Differentiate between step index and graded index fiber.
   (b) A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 50 μm. the fiber has numerical aperture of 0.25, estimate the total number of guided mode propagating in the fiber. When it is operating at a wavelength of 1μm.

12. Explain linear and non-linear scattering loss mechanisms in optical fibers.

13. Write detail notes on gain guided laser diodes and index guided laser diodes with neat sketches.

14. Explain the principle and construction of reach through APD.

15. Explain the principles of operation of a typical optical receiver with the help of schematic diagram.

16.(a) What are the applications of the WDM in LANs?
   (b) What are the differences between WDM and FDM.

17. Write short notes on the following:
   (a) Mode coupling
   (b) Fusion splicing technique

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I-Semester (Old) Examination, December 2013

Subject : Optical Fiber Communication
(Electives - I)

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Define Meridional rays, skew rays and numerical aperture.
2. Compare between step index and graded index fiber.
3. What is the significance of Numerical aperture?
4. What are the advantages of LASERS OVER LED?
5. How mode coupling is done?
6. What is the difference between gain guided laser diode and index guided laser diode?
7. What is the need of double hetrojunction structure?
8. What are the advantages of APD over PIN photo diode?
9. What are the different error sources in optical communication system?
10. How WDM is different from FDM?

PART – B (50 Marks)

11.(a) Differentiate between step index and graded index fiber.
   (b) A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 50 μm. the fiber has numerical aperture of 0.25, estimate the total number of guided mode propagating in the fiber. When it is operating at a wavelength of 1μm.

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15. Explain the principles of operation of a typical optical receiver with the help of schematic diagram.

16.(a) What are the applications of the WDM in LANs?
   (b) What are the differences between WDM and FDM.

17. Write short notes on the following:
    (a) Mode coupling
    (b) Fusion splicing technique

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE)   I – Semester (Old) Examination, December 2013

Subject : Data Communication and Computer Networks   (Elective – I)

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. What are the layers in a TCP/IP model?   (3)

2. What are the junctions of Network layers?   (2)

3. Draw the HDLC frame format and explain.   (3)

4. Explain sliding window protocols.   (3)

5. What is congestion control?   (2)

6. What are LAN/MAN standards?   (3)

7. Write notes on UDP.   (2)

8. Explain Principles of ATM.   (3)

9. Explain 802.3 standards.   (2)

10. Explain bit stuffing.   (2)

PART – B (5 x 10 = 50 Marks)

11. What are functionalities of the layers in a OSI model?   (10)

12.a) Differentiate between circuit switching and packet switching.   (4)
   b) Compare and contrast Leaky bucket and token bucket congestion control
      mechanism.   (6)

13.a) Compare 802.4 and 802.5 frame standards.   (6)
   b) Explain MAC performance.   (4)

14.a) Explain the principles of N-ISDN and B-ISDN.   (5)
   b) Compare frame relay and cell relay.   (5)

15.a) Explain the principles of public key cryptography in brief.   (5)
   b) Describe DES algorithm.   (5)

16. Write short notes on :
   a) Go back N ARQ   (5)
   b) X.25 packet switching   (5)

17. Write short notes on :
   a) Principles of Internetworking   (5)
   b) Routing with bridges   (5)

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I – Semester (Old) Examination, December 2013

Subject : Data Communication and Computer Networks (Elective – I)

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. What are the layers in a TCP/IP model?   (3)

2. What are the junctions of Network layers?   (2)

3. Draw the HDLC frame format and explain.   (3)

4. Explain sliding window protocols.   (3)

5. What is congestion control?   (2)

6. What are LAN/MAN standards?   (3)

7. Write notes on UDP.   (2)

8. Explain Principles of ATM.   (3)

9. Explain 802.3 standards.   (2)

10. Explain bit stuffing.   (2)

PART – B (5 x 10 = 50 Marks)

11. What are functionalities of the layers in a OSI model?   (10)

12.a) Differentiate between circuit switching and packet switching.   (4)
    b) Compare and contrast Leaky bucket and token bucket congestion control
       mechanism.   (6)

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16. Write short notes on :
    a) Go back N ARQ   (5)
    b) X.25 packet switching   (5)

17. Write short notes on :
    a) Principles of Internetworking   (5)
    b) Routing with bridges   (5)

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FACULTY OF ENGINEERING
B.E. 4/4 (ECE) I – Semester (New) (Main) Examination, December 2013

Subject: Digital Image Processing (Elective – I)

Time: 3 Hours   **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1.	Define dynamic range, spatial and intensity resolution of an image.	(3)
2.	List the properties of 2D DFT.	(2)
3.	Write the steps to generate Haar basis.	(3)
4.	Mention the two major drawbacks of KL transforms.	(2)
5.	Describe Contrast stretching.	(3)
6.	What is the difference between histogram equalization and histogram matching?	(2)
7.	What is an averaging filter? Mention its limitations.	(3)
8.	When will a Constrained Least Square filter reduce to an inverse filter?	(2)
9.	Explain Fidelity Criteria.	(3)
10.	What is the space required to store a 1200 X 1200, 8 bit gray scale image.	(2)

PART – B (50 Marks)

11.(a) Describe the digital image acquisition process. (4)

(b) Explain in detail the basic relationships between pixels. (6)

12.(a) State and prove the spatial shift property and periodicity property of a 2D DFT. (5)

(b) For the given 2 x 2 matrix, find the covariance matrix and its eigen values. (5)

$$x = \begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$$

13.(a) Describe some basic intensity transformation functions. (6)

(b) For a two bit image of size 5 x 5 compute the average value of intensities in the image. (4)

$$\begin{bmatrix} 0 & 0 & 1 & 1 & 2 \\ 1 & 2 & 3 & 0 & 1 \\ 3 & 3 & 2 & 2 & 0 \\ 2 & 3 & 1 & 0 & 0 \\ 1 & 1 & 3 & 2 & 2 \end{bmatrix}$$

14.(a) Draw the block diagram for histogram equalization and explain. (5)

(b) What will be the value of the central pixel 4, if it is smoothened by a 3x3 box filter? (5)

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 4 & 3 \end{bmatrix}$$

15.(a) For the data given obtain the Huffman code for the symbols.

Symbol	Probability
a_2	0.4
a_6	0.3
a_1	0.1
a_4	0.1
a_3	0.06
a_5	0.04

(b) Draw the block diagram and explain lossless predictive coding. (5)

16.(a) What is salt and pepper noise? How can it be removed? (4)

(b) Explain the approach for adaptive context based arithmetic coding. (6)

17. Write short notes on: (10)
   a) Weiner filtering
   b) Homomorphic filtering
   c) Threshold coding.

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FACULTY OF ENGINEERING
B.E. 4/4 (ECE) I – Semester (New) (Main) Examination, December 2013

Subject: Digital Image Processing (Elective – I)

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1. Define dynamic range, spatial and intensity resolution of an image. (3)
2. List the properties of 2D DFT. (2)
3. Write the steps to generate Haar basis. (3)
4. Mention the two major drawbacks of KL transforms. (2)
5. Describe Contrast stretching. (3)
6. What is the difference between histogram equalization and histogram matching? (2)
7. What is an averaging filter? Mention its limitations. (3)
8. When will a Constrained Least Square filter reduce to an inverse filter? (2)
9. Explain Fidelity Criteria. (3)
10. What is the space required to store a 1200 X 1200, 8 bit gray scale image. (2)

PART – B (50 Marks)

11.(a) Describe the digital image acquisition process. (4)
   (b) Explain in detail the basic relationships between pixels. (6)

12.(a) State and prove the spatial shift property and periodicity property of a 2D DFT. (5)
   (b) For the given 2 x 2 matrix, find the covariance matrix and its eigen values. (5)

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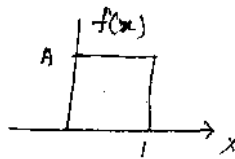| Symbol	Probability
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a_1	0.1
a_4	0.1
a_3	0.06
a_5	0.04

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   (b) Explain the approach for adaptive context based arithmetic coding. (6)

17. Write short notes on: (10)
   a) Weiner filtering
   b) Homomorphic filtering
   c) Threshold coding.

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I – Semester (Old) Examination, December 2013

Subject : Digital Image Processing (Elective – I)

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Give the forward Hadamard Kernel. (2)
2. What is sinusoidal interference? How is it removed? (3)
3. Give the (3 x 3) mask for a high pass spatial filter. (2)
4. What is median filtering? (2)
5. Explain the terms coding, inter pixel and psycho visual redundancies used in image compression. (3)
6. Explain about bright light vision and dim light vision. (3)
7. Draw the Lossy predictive encoder and decoder models used in image compression. (3)
8. Distinguish between image enhancement and restoration. (3)
9. Give any two applications of discrete cosine transform. (2)
10. What is brightness and contrast with reference to an image? (2)

PART – B (50 Marks)

11. a) Explain the elements of visual perception. (4)
    b) Discuss the sampling and quantization process of image. (6)

12. a) Define the 2-dimensional discrete Fourier transform prove its periodicity and conjugate symmetry properties. (6)
    b) For the simple function shown, obtain its Fourier transform. (4)

13. a) Compare the enhancement in spatial and frequency domains. (5)
    b) What is Histogram? Explain how it is used in image enhancement. (5)

14. a) Give the reasons for the degradation of image. (3)
    b) With all the necessary equations explain the least mean squares restoration. (7)

15. a) Explain with an example, the Huffman coding algorithm for image data compression. (7)
    b) What is bit plane coding? (3)

16. a) Derive the 4 x 4 Haar transform matrix. (6)
    b) Explain the applications of Hotelling transform. (4)

17. Write a short notes on :
    a) Transform coding (4)
    b) Image zooming techniques (3)
    c) Homomorphic filtering (3)

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I – Semester (Old) Examination, December 2013

Subject : Digital Image Processing   (Elective – I)

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Give the forward Hadamard Kernel.   (2)
2. What is sinusoidal interference? How is it removed?   (3)
3. Give the (3 x 3) mask for a high pass spatial filter.   (2)
4. What is median filtering?   (2)
5. Explain the terms coding, inter pixel and psycho visual redundancies used in image
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6. Explain about bright light vision and dim light vision.   (3)
7. Draw the Lossy predictive encoder and decoder models used in image compression. (3)
8. Distinguish between image enhancement and restoration.   (3)
9. Give any two applications of discrete cosine transform.   (2)
10. What is brightness and contrast with reference to an image?   (2)

PART – B (50 Marks)

11.a) Explain the elements of visual perception.   (4)
   b) Discuss the sampling and quantization process of image.   (6)

12.a) Define the 2-dimensional discrete Fourier transform prove its periodicity and
     conjugate symmetry properties.   (6)
   b) For the simple function shown, obtain its Fourier transform.   (4)

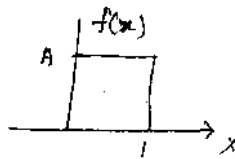13.a) Compare the enhancement in spatial and frequency domains.   (5)
   b) What is Histogram? Explain how it is used in image enhancement.   (5)

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   b) With all the necessary equations explain the least mean squares restoration.   (7)

15.a) Explain with an example, the Huffman coding algorithm for image data
     compression.   (7)
   b) What is bit plane coding?   (3)

16.a) Derive the 4 x 4 Haar transform matrix.   (6)
    b) Explain the applications of Hotelling transform.   (4)

17. Write a short notes on :
    a) Transform coding   (4)
    b) Image zooming techniques   (3)
    c) Homomorphic filtering   (3)

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FACULTY OF ENGINEERING

B.E. 4/4 (CSE) I – Semester (Old) Examination, December 2013

Subject : Embedded Systems (Elective – I)

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Define an Embedded system. (2)

2. What do you mean by 'real time' and 'real time clock'. (3)

3. Write the features of a ARM7TDMI processor. (2)

4. Explain pipelining in PIC controller. (3)

5. How does CAN indicate the start and end of a byte or data frames? (3)

6. What do you mean by hot attachment and detachment? (2)

7. How is the context switching handled in ARM7? (3)

8. What do you mean by POSIX function? (2)

9. What are the advantages of using an ICE? (3)

10. What is a cross-assembler? (2)

PART – B (5 x 10 = 50 Marks)

11.a) Explain the need of watchdog timer and reset after the watched time. (4)
    b) Explain the processor architecture to design Embedded system. (6)

12.a) Explain use of each control bit of I^2C bus protocol. (5)
    b) What is shared data problem? Explain how it can be solved using critical section. (5)

13.a) What is the role of interrupt service routine in device drivers? (5)
    b) What are the advantages of re-entrant functions in embedded system software? (5)

14.a) Give an example of a deadlock situation during multiprocessing execution. (5)
    b) How the synchronization process take place in Embedded processor? (5)

15.a) Explain functions of device programmer. (5)
    b) What is a petrinet and FSM? Explain their use in modeling embedded system. (5)

16. Discuss the features of Vx works and MuCOS. (10)

17. Write short notes on the following :
    a) Software Co-design process (5)
    b) Host-Target development (5)

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FACULTY OF ENGINEERING

B.E. 4/4 (CSE) I – Semester (Old) Examination, December 2013

Subject : Embedded Systems (Elective – I)

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Define an Embedded system.   (2)

2. What do you mean by 'real time' and 'real time clock'.   (3)

3. Write the features of a ARM7TDMI processor.   (2)

4. Explain pipelining in PIC controller.   (3)

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PART – B (5 x 10 = 50 Marks)

11.a) Explain the need of watchdog timer and reset after the watched time.   (4)
   b) Explain the processor architecture to design Embedded system.   (6)

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15.a) Explain functions of device programmer.   (5)
   b) What is a petrinet and FSM? Explain their use in modeling embedded system.   (5)

16. Discuss the features of Vx works and MuCOS.   (10)

17. Write short notes on the following :
   a) Software Co-design process   (5)
   b) Host-Target development   (5)

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I – Semester (New) (Main) Examination, December 2013

Subject: System Automation and Control (Elective – I)

Time: 3 Hours   **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1. List out the performance terminology for sensors.   (2)
2. What are applications of motion sensor / detectors?   (2)
3. What are the criteria to choose suitable data acquisition equipment?   (3)
4. What is error voltage in Op-Amp? How can it be reduced?   (3)
5. A differential dc amplifier has a differential mode gain of 100 and common mode
    gain 0.01. What is its CMRR in dB?   (3)
6. Draw ladder diagram for AND and OR logic functions.   (3)
7. List out the instruction sets for microcontroller.   (2)
8. What is the overall transfer function of the negative feedback system having   (3)

$$G(S) = \frac{2}{S+1} \text{ and } H(S) = \frac{1}{S+2}$$

9. List out the real world applications for motion control.   (2)
10. What is the purpose of sampling?   (2)

PART – B (50 Marks)

11.(a) Describe briefly proximity sensor.   (5)
   (b) What are the criteria for selection of sensor?   (5)

12.(a) With the help of neat block diagram explain dual slope integration A/D converter. (5)
   (b) What do you mean by sampling? Why it is necessary? Explain in detail.   (5)

13.(a) Explain hydraulic and pneumatic building blocks with the help of describing
       equations and energy stored / power dissipated.   (5)
   (b) Explain rotational-translation system.   (5)

14.   Draw the basic structure of PLC and explain in detail.   (10)

15.(a) Explain components of motion control system.   (5)
   (b) Describe the general characteristics of stepper motor.   (5)

16.   Derive second order differential equation for second order system.   (10)

17.   Write short notes on: (10)
       a) Closed loop controllers
       b) Application of washing machine using microcontroller.

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I – Semester (New) (Main) Examination, December 2013

Subject: System Automation and Control (Elective – I)

Time: 3 Hours   **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1. List out the performance terminology for sensors.   (2)
2. What are applications of motion sensor / detectors?   (2)
3. What are the criteria to choose suitable data acquisition equipment?   (3)
4. What is error voltage in Op-Amp? How can it be reduced?   (3)
5. A differential dc amplifier has a differential mode gain of 100 and common mode
    gain 0.01. What is its CMRR in dB?   (3)
6. Draw ladder diagram for AND and OR logic functions.   (3)
7. List out the instruction sets for microcontroller.   (2)
8. What is the overall transfer function of the negative feedback system having   (3)

$$G(S) = \frac{2}{S+1} \text{ and } H(S) = \frac{1}{S+2}$$

9. List out the real world applications for motion control.   (2)
10. What is the purpose of sampling?   (2)

PART – B (50 Marks)

11. (a) Describe briefly proximity sensor.   (5)
    (b) What are the criteria for selection of sensor?   (5)

12. (a) With the help of neat block diagram explain dual slope integration A/D converter. (5)
    (b) What do you mean by sampling? Why it is necessary? Explain in detail.   (5)

13. (a) Explain hydraulic and pneumatic building blocks with the help of describing
        equations and energy stored / power dissipated.   (5)
    (b) Explain rotational-translation system.   (5)

14. Draw the basic structure of PLC and explain in detail.   (10)

15. (a) Explain components of motion control system.   (5)
    (b) Describe the general characteristics of stepper motor.   (5)

16. Derive second order differential equation for second order system.   (10)

17. Write short notes on: (10)
    a) Closed loop controllers
    b) Application of washing machine using microcontroller.

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