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(20514)

Roll No. ....

B.Tech.-IV Sem.

**TU-109**

B.Tech. Examination, May 2014

EC/ME/EI  
Mathematics-III

[BT-405(N)]

Time : Three Hours / [Maximum Marks : 100]

**Note:** Attempt any **five** questions. **All** questions carry equal marks.

1. (a) Test the analyticity of the function  
 $w = \sin z$  and hence derive that

$$\frac{d}{dz} (\sin z) = \cos z \quad 10$$

- (b) Find the value of the integral

$$\int_c \frac{3z^2 + 7z + 1}{z + 1} \text{ where } c \text{ is the circle}$$

$$|z| = \frac{1}{2} \quad 10$$

2. (a) Expand  $\cos z$  about the point  $z = \left(\frac{\pi}{2}\right)$

P.T.O.

by Taylor's series.

10

- (b) Use the complex variable technique to find the value of the integral

$$\int_0^{2\pi} \frac{d\theta}{5 + 3 \cos \theta}$$

10

3. (a) Calculate the first four moments of the following distribution about the mean.

10

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

- (b) Find a straight line that can be fitted to the following data:

10

x	1	2	3	4	5	6
y	1200	900	600	200	110	50

4. (a) Establish the formula

$\sigma_{x-y}^2 = \sigma_x^2 + \sigma_y^2 - 2r\sigma_x\sigma_y$ . Where  $r$  is the correlation coefficient between  $x$  and  $y$ .

10

- (b) Ten percent of screws produced in a certain factory turn out to be defective. Find the probability that in a sample of 10 screws chosen at random; exactly two will be defective.

10

5. (a) Find the probability that in ten tosses of a fair coin, a head appears

(i) at no time      (ii) once  
(iii) twice      (iv) thrice

- (b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. 10

6. (a) Using bisection method, find the negative root of  $x^3 - x + 11 = 0$  10

- (b) Find the double root of  $f(x) = x^3 - x^2 - x + 1 = 0$  by Newton - Raphson method. 10

7. (a) Find the value of  $\nabla^2 y_5$ , given: 10  
 $y_1 = 2, y_2 = 5, y_3 = 10, y_4 = 17, y_5 = 26$

- (b) Find the number of men getting the wages Rs. 10 and Rs. 15 from the following table: 10

Wages	0-10	10-20	20-30	30-40
Frequency	9	30	35	42

8. (a) Solve the system  
 $2x + y + 4z = 12, 8x + 3y + 2z = 20,$   
 $4x + 11y + z = 33$  by Crout's method.

10

- (b) Explain Gauss-Seidel's method for the following system of equation. 10

$$a_{11}x + a_{12}y = b_1$$

$$a_{21}x + a_{22}y = b_2$$

9. (a) Find  $\frac{dy}{dx}$  at  $x = 4$  by using the following table: 10

x	0	2	5	1
y	0	8	125	1

- (b) Use Picard's method to approximate the value of  $y$  when  $x=0.1$  given  $y=1$  at

$$x=0 \text{ and } \frac{dy}{dx} = \frac{y-x}{y+x} \quad 10$$

10. (a) Using Runge's Kutta's method, find  $y$  at  $x=1.1$

$$\text{given } \frac{dy}{dx} = 3x + y^2, \quad y(1) = 1.2 \quad 10$$

- (b) Write a short notes on any **two** of the following: 10

(i) Convergence of Newton-Raphson method

(ii) Binomial distribution

(iii) Simpson's one third rule

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B.Tech. IV Sem.

**TU-110**

**B.Tech. Examination, May 2014**

**EC/EI/ME BRANCH**

**TRANSDUCERS AND SENSORS**

[BT-406(N)]

*Time : Three Hours ]*

*[Maximum Marks : 100*

**Note:** Attempt any **five** questions. **All** questions carry equal marks.

1. (a) Define the following terms:

(i) Resolution

(ii) Span

(iii) Dead zone

(iv) Sensitivity

(v) Threshold

P.T.O.



- (b) An  $820\Omega$  resistance with an accuracy of  $\pm 10\%$  carries a current of 10 mA. The current was measured by an analog meter on 25 mA range with an accuracy of  $\pm 2\%$  of full scale. Calculate the power dissipated 'P' in the resistor and % error in 'P'.
2. (a) Explain the difference between deflection and null type instruments giving suitable examples.
- (b) Explain how the effects of Modifying and Interfering inputs are minimized in measurement systems.
3. (a) Describe the constructional details of a resistive potential divider and derive the expression for its output voltage when connected across a meter of finite impedance.

(b) Write a short note on velocity sensory.

4. A parallel plate capacitive transducer uses plates of area  $500 \text{ mm}^2$  which are separated by a distance of  $0.2 \text{ mm}$ . Calculate the value of capacitance when the dielectric is air having a permittivity of  $8.85 \times 10^{-12} \text{ F/m}$ .

(i) Calculate the change in capacitance if a linear displacement reduces the distance between the plates to  $0.18 \text{ mm}$ . Also calculate the ratio of per unit change of capacitance to per unit change of displacement.

(ii) Suppose a mica sheet  $0.01 \text{ mm}$  thick is inserted in the gap. Calculate value of original capacitance and change in capacitance for the same displacement. Also calculate the ratio of per unit change

in capacitance to per unit change in displacement. Dielectric constant of mica is 8.

5. (a) Explain the construction and working of U-tube Manometer. Also list the errors that can occur in manometers along with their advantages and disadvantages.
- (b) Write the basic principle, construction and working of Pirani gauge. What are its advantages, disadvantages and rang?
6. (a) Discuss briefly about dynamometers.
- (b) What are Elastic type pressure transducers? What are the different types of primary sensing elements used in them? Explain their construction with a neat and clean diagram.



7. (a) A Venturimeter has an area ratio of 9 to 1, the larger diameter being 30cm. During the flow, the recorded pressure head in the larger section is 6.5m and at the throat 4.25m. If meter coefficient is 0.99, compute the discharge through the meter in litres per second.
- (b) What is meant by inferential flow meters? Name its few types.

8. (a) Discuss vortex shedding flowmeter along with its advantages and disadvantages.
- (b) With proper diagram, explain the working of Rotameter also explain the reason for variable area used in Rotameter. What effect will appear on the readings if the Rotameter is placed horizontally?

9. (a) What is meant by pyrometry? Explain the working principle of optical pyrometer. Also explain the three conditions of filament. Write its range, advantages and disadvantages.
- (b) What are thermocouples? Explain their working principle with a neat diagram. What are the materials normally used in making thermocouples? What are their major advantages? Give their range.
10. (a) What are the sources of errors in Filled-system thermometers? Explain liquid in glass thermometer with the help of a neat and well labeled diagram.
- (b) A thermistor has resistance of  $3980\ \Omega$  at ice point and  $794\ \Omega$  at  $50^\circ\text{C}$ . The

resistance temperature relationship is given by  $R_T = aR_0 \exp\left(\frac{b}{T}\right)$ . Calculate the constants  $a$  and  $b$ . Also calculate the range of resistance to be measured in case the temperature varies from  $40^\circ\text{C}$  to  $100^\circ\text{C}$ .

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Roll No. ....

B.Tech.IV Sem.

**TU-112**

**B. Tech. Examination, May 2014**

**EC**

**Computer Organization**

**BT-407(N)**

*Time : Three Hours ]*

*[Maximum Marks : 100*

**Note :** Attempt any **five** questions. **All** questions carry equal marks.

1. (a) With the help of diagram explain block diagram of digital computer. 10

(b) Convert the following number with the indicated bases to decimal :

(i)  $(4310)_5$  5

(ii)  $(110110100)_2$  5

P.T.O.

2. (a) Design a 4-bit combinational circuit decrements using four full adder circuits. 10
- (b) The following transfer statements specify a memory. Explain the memory operation in each case. 10
- (i)  $R_2 \leftarrow M[AR]$
  - (ii)  $M[AR] \leftarrow R_3$
  - (iii)  $R_5 \leftarrow M[R_5]$
3. Define the following :
- (a) Control memory 5
  - (b) Control word 5
  - (c) Sequencer 5
  - (d) Pipeline register 5
4. Explain Booths multiplication algorithm along with suitable example. 20
5. (a) What is addressing Modes? Explain in detail. 10



- (b) Explain difference between 2D and  $2\frac{1}{2}$ D memory organization in detailed. 10
6. (a) What is the stack organization? Describe all functionality regarding to stack? 10
- (b) Describe the micro instruction format for the control memory. 10
7. Write short note on :
- (a) Locality of reference 5
- (b) Hit ratio 5
- (c) Mapping 5
- (d) Multiprogramming 5
8. (a) What is difference between isolated I/O and memory mapped I/O? What are the advantages and disadvantages of each? 10
- (b) With the help of a diagram explain DMA. 10

9. A digital computer has a memory unit  $64K \times 16$  and a Cache memory of  $1k$  words the Cache uses direct mapping with a block size of four words. 20

- (a) How many bits are there in the tag, index, block and word field of the address format?
- (b) How many bits are there in each word of Cache, and how they divided into functions? Include a valid bit.
- (c) How many blocks can the Cache accommodate?

10. Define the following :

- (a) Memory Hierarchy 5
- (b) Virtual memory 5
- (c) Page fault 5
- (d) Page replacement 5

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B.Tech. - IV Sem.

**TU-114**

**B.Tech. Examination, May 2014**  
**E.C.**

**Introduction of Microprocessor**

**[BT-409(N)]**

*Time : Three Hours ]*

*[Maximum Marks : 100*

**Note :** Attempt any **five** questions. All questions carry equal marks.

1. (a) What are the addressing modes available in 8085. Explain each of them. Also give at least two examples of each type.

10

- (b) Enlist the characteristics of a microprocessor.

10

P.T.O.

2. (a) With the help of a neat diagram, explain the architecture of 8085 Microprocessor. 10

(b) Give the clock out frequency and state time  $T$ , of an 8085 operating with each of the following crystals: 6.25 MHz, 5MHz, 4MHz, 6.144 MHz. 10

3. (a) Write a program to find the square root of a number. 10

(b) Write a program to Generation of Fabonacci series. 10

4. What is a stack? What are its uses? Explain instruction of 8085 which involve stack operation. 20

5. What is an interrupt? List and differentiate any two type of interrupts. Explain the interrupts of 8085 clearly stating their priority, inputs and vectored locations. 20
6. Draw timing diagrams for Minimum mode and Maximum mode of 8086. 20
7. What do you mean by assembler directives? Write a program for 8086 in assembly language to check if string initialized in the data segment is Palindrome or not. Clearly specify the comments and state the addressing mode for each instruction. 20
8. Draw the pin diagram of 8255 and explain its different modes of operation. 20



9. Draw the Block diagram of 8259 PIC, and  
Explain all ICWs and OCWs of 8259. 20

10. Explain the following: 20

(i) 8237 DMA Controller

(ii) 8253/8254

(iii) USART

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B.Tech. IV Sem.

**TU-111**

B. Tech. Examination, May 2014

E. C.

Computer Architecture & Organization

[BT- 402 (N)]

Time : Three Hours ]

[Maximum Marks : 100

**Note:** Attempt any **five** questions. All questions carry equal marks.

1. (a) Perform the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend.
  - (a)  $11010 - 10000$
  - (b)  $11010 - 1101$
  - (c)  $100 - 110000$
  - (d)  $1010100 - 1010100$
- (b) Convert the following decimal numbers to the bases indicated
  - (a) 7562 to octal
  - (b) 1938 to hexadecimal

P.T.O.

- (c) 175 to binary
  - (d) 792 to octal
2. (a) Design a 4-bit combinational circuit decremented using four full-adder circuits.
- (b) A digital computer has a common bus system for 16 registers of 3 bits each. The bus is constructed with multiplexers
- (a) How many selection inputs are there in each multiplexer?
  - (b) What size of multiplexers are needed?
  - (c) How many multiplexers are there in bus?
3. (a) What is the difference between a direct & an indirect address instruction? How many references to memory are needed for each type of instruction to bring operand into a processor register?
- (b) Derive the control gates associated with the program counter PC in the basic computer.

4. (a) Explain the difference between hardwired control & microprogrammed control. Is it possible to have a hardwired control associated with a control memory? 10
- (b) Define the following : 20
- (a) Microoperation
  - (b) Microinstruction
  - (c) Microprogram
  - (d) Microcode
5. Draw a flow chart for multiplication of floating point numbers. 20
6. A digital computer has a memory unit of  $64k \times 16$  & a cache memory of 1 k words. The cache uses direct mapping with a block of size of four words.
- (a) How many bits are there in the tag, index block & word fields of the address formats.
  - (b) How many bits are there in each word of cache, and how are they divided into functions? Include a valid bit.



(c) How many blocks can the cache accommodate.

7. (a) An 8-bit register contains the binary value 10011100. What is the register value after an arithmetic shift right? Starting from the initial number 10011100 determine the register value after an arithmetic shift left & state whether there is an overflow.

(b) Explain these instruction 10

(a) CLA (b) CLE

(c) CIL (d) CIR

(e) SZA

8. Derive the circuit for a 3-bit parity generator & 4-bit parity checker using an even-parity.

9. (a) Explain 3 to -8 live decoder. 10

(b) Represent decimal no. 8620 in

(a) BCD

(b) excess- 3 code

(c) 2421 code

(d) as binary number

10. Explain architecture & addressing modes of 8085 in detail. 20



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B.Tech. IV Sem.

**TU-133 (A)**

**B.Tech. Examination, May. 2014**

**Industrial Sociology**

**[BT-423(O)]**

*Time : Three Hours ]*

*[Maximum Marks : 100*

**Note :** Attempt any **five** questions. **All** questions carry equal marks.

1. (a) Diagrammatically (Flow chart) Discuss the scope of Industrial Sociology.  
(b) Discuss Historical Development of Industrial Sociology.
2. (a) Sketch the historical emergence of early Industrialism in India.  
(b) Elaborate the Sallent features of feudal system prevailing during medieval India.

P.T.O.

3. (a) Write consequences of hearing industrialization in Sociological Perspective.  
(b) Give a brief note on Industrial policy Resolution- 1956.
4. (a) What are the important grievances of worker in industry? How can you handle them effectively? Suggest measures.  
(b) Enumerate various types of industrial disputes. Explain any one in detail.
5. (a) Examine the contribution of industrial revolution to the rise and development of industry on modern lines.  
(b) Write a brief note on theory of class struggle
6. (a) Discuss the nature of Industrial Conflict.  
What measures would you suggest for the attainment of industrial peace?

- (b) Briefly explain the important tripartite committees setup in India for the resolution of Labour problems.
7. (a) Write the causes and consequences of industrialization in India.
- (b) Explain the phenomena of striker and Lockouts in industry. What remedies would you like to suggest to control them?
8. (a) Define the concept of Industrial Sociology with the help of different Sociological theories.
- (b) What is social dynamics? How it can be given a positive energy in an industrial setting.
9. (a) Which are the important Legislative agencies working for Labour disputes? Discuss their roles in brief.



- (b) As a would be engineers how far do you agree to learn sociological perspective of Technology? Give reasons.

10. Write short notes on any **four** of the following :

- (a) International Labour organisation
- (b) De-Industrialization
- (c) Code of discipline
- (d) Industrial Tribunals
- (e) Barter system
- (f) Industrialization and its impact on Environment
- (g) Globalization leading to development of ICT

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B.Tech. IV Sem.

**TU-117A**

**B. Tech. Examination, May 2014**

**EC/IT**

**Nano Science**

**BT-425(N)**

*Time : Three Hours /*

*[Maximum Marks : 100]*

**Note :** Attempt any **five** questions. **All** questions carry equal marks.

1. Write short notes on application of nanotechnology.
2. What do you understand by quantum well, quantum wire and quantum dot.? Give example of each. Describe the techniques in details for their formation.

P.T.O.



3. Describe pulse laser deposition technique for the formation of nanomaterials. What are advantages and shortcoming of this method.
4. Discuss the basic principle and fabrication of AFM and TEM.
5. What is the difference between Fullerene and carbon nanotubes? Discuss about their structure, electronic and mechanical properties.
6. Explain
  - (i) Tetrahedrally bounded semiconductor structures.
  - (ii) Energy bands and gaps of semiconductors.
7. Discuss the preparation of quantum Nano structure, size and dimensionality effect.
8. Explain the Lithographic and non-lithographic techniques for nano-materials.

9. Explain Infrared and Raman spectroscopy.

10. Explain

(i) Magic Number

(ii) Single electron transistors.

R. Tech. Examination, May 2014

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Exam Scheme

EE-42001

Time: Three Hours

(Maximum Marks: 100)

Q.1. Attempt any three questions. All parts

have carry equal marks.

Write short notes on application of  
Infrared and Raman spectroscopy.

Q.2. What is the significance of quantum well?

Q.3. What is the significance of quantum dot? Give an

example of each. Describe the mechanism of

operation of each transistor.

TU-117A13