

Total No. of Pages: 1

Roll No. 35

B.Tech. [IEP]

FIFTH SEMESTER

MID SEMESTER EXAMINATION / September-2018

EP-301: Semiconductor Devices

Max. Marks: 25

Time: 1.5 Hours

Note : Answer ALL questions.
Assume suitable missing data, if any.

1. (a). Calculate free electron concentration, mobility and drift velocity of electrons in a aluminium wire of length 3mt and resistance of 0.04Ω carrying a current of 10amp. Assume that each aluminium atom contributes two electrons for conduction.

(Given that resistivity of aluminium is $2.7 \times 10^{-8} \Omega m$, atomic weight is 26.98, density of aluminium is $2.7 \times 10^3 \text{ Kg/m}^3$ and Avagadro number is $6.025 \times 10^{23}/\text{mol}$) (4)

(b). Determine the temperature at which there is 1% probability that a state 0.30eV below the Fermi energy level will not contain an electron.

(Boltzmann constant $K=8.62 \times 10^{-5} \text{ eV/K}$) (2)

2. (a). What about degenerate, non-degenerate and compensated semiconductors. Deduce an expression for electron concentration in a n-type semiconductors. (4)

(b). Calculate the thermal equilibrium electron and hole concentration in a compensated p-type semiconductor at $T=300K$ in which acceptor and donar concentrations respectively are $N_a=10^{16}/\text{cm}^3$ and $N_d=3 \times 10^{15}/\text{cm}^3$. Assume that the intrinsic carriers concentration is $n_i=1.5 \times 10^{10}/\text{cm}^3$. (2)

3. (a). Define Hall effect? Deduce an expression for Hall coefficient and carrier concentration using Hall effect phenomenon. Write any four applications of Hall effect. (4)

(b). The resistivity values of an intrinsic semiconductor are $4.5\Omega m$ and $2.0 \Omega m$ at $20^\circ C$ and $32^\circ C$ respectively. Calculate energy band gap of the semiconductor. (2)

4. (a). Deduce expressions for the thermal equilibrium electron and hole concentrations in the conduction and valance bands respectively of a semiconductor using Fermi function and density of states. (5)

(b). Calculate thermal equilibrium electron and hole concentrations in silicon at $400K$ temperature. Assume that Fermi energy is $0.27eV$ above the valance band energy.

(Given that N_c and N_v values for silicon at $300K$ are $2.8 \times 10^{19}/cm^3$ and $1.04 \times 10^{19}/cm^3$ respectively). (2)

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Total No. of Pages 1

FIFTH SEMESTER

B.Tech. (Engineering Physics)

MID TERM EXAMINATION

September 2018

EP 303 : ELECTROMAGNETIC THEORY, ANTENNAS AND PROPAGATION

Time: 1 Hour 30 Minutes

Max. Marks: 30

Note : Attempt any three Questions

Assume suitable missing data, if any

1(a) Show that equation of continuity $\operatorname{div} \vec{J} + \frac{\partial \rho}{\partial t} = 0$ is contained in Maxwell's equations. (2)

③ (b) Using Maxwell's equations derive the electric and magnetic wave equations. (3)

(c) Show that the ratio of the cross-section of a circular waveguide to that of a rectangular one $A_c/A_r = 2.17$ if each is to have the same cutoff wavelength for its dominant mode. (3)

(d) Show that TEM wave can not exist inside a waveguide. (2)

2(a) A surface plasma wave (SPW) of frequency $\omega = 2 \times 10^{15}$ rad./sec propagates over a conductor – free space interface. The conductor has $\epsilon_r = 10$, $\omega_p = 8 \times 10^{15}$ rad./sec.

Estimate the wavelength of SPW. (3)

② (b) Differentiate between waveguides and two wire transmission lines. (2)

(c) An air-filled rectangular waveguide of inside dimensions 7x3.5 cm operates in the dominant TE₁₀ mode. (5)

(i) Find the cutoff frequency (ii) Determine the phase velocity of the wave in the guide at a frequency of 3.5GHz (iii) Determine the guide wavelength at the same frequency .

3. Show that the solution to the Helmholtz equation in rectangular coordinates is given by (10)

$$\psi = [A \sin(k_x x) + B \cos(k_x x)] [C \sin(k_y y) + D \cos(k_y y)] e^{-j\beta g z}$$

4. Derive the Transmission line equations and solve the lossless transmission line (10) under the given conditions , where the velocity of propagation is 2.5×10^8 m/s and

capacitance of the line is 30 pF/m. Find the following parameters:

(a) Inductance of the line (b) Phase constant at 100 MHz (c) Characteristics impedance of the line

-END-

Total no. of Pages: 02
Mid Term Exam
Fifth Semester

Roll no.....
Sep-2018
B.Tech.OEC

CO361 Database Management System

Duration: 1.5 Hrs.

Max Marks: 25

NOTE: Attempt all the questions. Assume the missing data if any.

Q1. Answer the following questions in brief: (2x4=8)

- a) Use Armstrong's axioms to prove the soundness of the pseudo transitivity rule.
- b) Write down the functions of DBA.
- c) What is query processor?
- d) Define the term primary key with suitable example.

Q2. Given the relational schema. (2x4=8)

ENROLL(s#, c#, section) – s# represents student number

- ✓ TEACH (prof, c#, section) – c# represents course number
- ADVISE (prof, s#) – prof is thesis advisor of s#
- ✓ PRE_REQ(c#, pre_c#) – pre_c# is prerequisite course
- GRADES (s#, c#, grade, year)
- ✓ STUDENT(s#, sname) – sname is student name

Give queries expressed in relational algebra for the following queries:

- (i) List all students taking courses with Smith or Jones.
- (ii) List all students taking at least one course that their advisor teaches.
- (iii) List those professors who teach more than one section of the same course.
- (iv) List the courses that student 'John' can enroll, i.e. has passed the necessary prerequisite courses but not the course itself.

P.T.O.

Q3. What is functional dependency? Write down the rules for finding implied functional dependencies from a set of given FD's. (5)

Q4. Draw an ER diagram for a garment manufacturing company. The entity includes warehouses, production units, marking wing, vendor and product types. Define the relationship between each of these entities and take the attributes so that they can define a particular entity property. (4)

END

Total No of Pages 02

Roll. No.....

SIXTH SEMESTER

B.TECH

MID SEMESTER EXAMINATION

Sept.2018

HU301 TECHNICAL COMMUNICATION

Time: 1.50 Hours

Max. Marks: 25

Note: Answer all the questions
Assume suitable missing data, if any.

1. Choose the correct synonym for the words given below: 5

- i) Clandestine
 - a) abortive
 - b) tangible
 - c) secret
 - d) doomed
- ii) Abstruse
 - a) exciting
 - b) recondite
 - c) profound
 - d) suspended
- iii) objurgate
 - a) scold
 - b) assuage
 - c) disgraceful
 - d) vicious assault
- iv) Immaculate
 - a) unsullied
 - b) angered
 - c) chastened
 - d) chewed
- v) perfunctory
 - a) demanding
 - b) disinterested
 - c) thorough
 - d) superficial

2. Write short notes on (any two) the following: 10

- i) Importance of body language
- iii) Group communication
- iv) Technical communication

3. Write an essay on one of the following:
- ✓ Digital economy
 - Decriminalization of beggary
 - My Indianness is reflected through.....

10

-END-

Total No. of Pages: 01
FIFTH SEMESTER
MID SEMESTER EXAMINATION

Roll No.....35.....
B.TECH.
(Sep- 2018)

EP311 COMPUTER NETWORKS

Time: 1:30 Hours

Max. Marks: 25

Note: All questions are compulsory
Assume suitable missing data, if any.

6 Q.1 With the help of a suitable block diagram explain concept of layered architecture of a computer network. (6)

6* Q.2 Differentiate between

1. Guided and unguided media
2. Error detection and Error correction
3. FDMA and TDMA
4. Go-back-N and Selective Repeat

(2*4=8)

5* Q.3 What is the need of Medium Access layer and associated Protocols . What are the salient features of Random access Protocols? Explain Aloha, CSMA, and CSMA/CD. (6)

4+ Q.4 Write a short note on Local area Networks (5)

END

Total No. of Pages 1

FIFTH SEMESTER

Mid Semester Examination

Roll No.

B.Tech. (EC-313)

(SEP-2018)

EC-313 MICROPROCESSOR AND INTERFACING

Time: $1\frac{1}{2}$ Hour

Max. Marks: 20

Note: Attempt All questions. Assume suitable missing data, if any.

- | | | |
|---|---|---|
| 1 | a. Draw the timing diagram of following instruction
8000 H: SPHL
Explain all machine cycles | 2 |
| | b. What happens when <u>RESETIN</u> signal goes low in 8085 Processor | 2 |
| 2 | a. Why segment registers are called relocatable registers | 2 |
| | b. Design an interfacing circuit to connect 4KB RAM and 2KB ROM to 8085 without any fold back memory with address starting from 1000H and 4000H respectively | 3 |
| 4 | a. Explain the functions of following assembler directives with example
i ALIGN
ii LABEL | 2 |
| | b. Identify Addressing mode of following instructions and calculate physical address of the operand and branch address respectively, if DS = 1000H, SI=1235H, BX = 2050H, CS = 4000H
i ADD CX, [BX+SI+16]
ii JMP [BL+4] | 4 |
| 5 | a. Write an assembly language program to find Average of two 8 bit numbers placed at consecutive locations starting from 2000H | 3 |
| | b. Write an assembly language program to count all even numbers among four 8 bit numbers placed at consecutive locations starting from 2050H. Store the result at 2060H | 2 |

-END-

V-AE

Total No. of Pages: 2
FIFTH SEMESTER
END SEMESTER EXAMINATION

Roll No.
B.Tech. [E P]
(November-2018)

EP301-Semiconductor Devices

Time : 3:00 Hours

Note: Answer **ANY FIVE** questions
Assume suitable missing data, if any.

Max. Marks: 50

1. (a). Describe the principle, construction and working condition of Bipolar Junction Transistor (BJT). Explain how it acts as an amplifier with a circuit diagram. Discuss the input and output characteristics of a BJT in a common base configuration. (7)
- (b). A common base BJT amplifier has an input resistance of 20Ω and output resistance of $100k\Omega$. If the collector load is $1k\Omega$ and if a signal of $500mV$ is applied between emitter and base then find the voltage amplification. (Assume that current amplification factor is equal to one). (3)
2. (a). Describe the principle, construction and working condition of Field Effect Transistor (FET). Explain how FET acts as an amplifier with a circuit diagram along with its output characteristics. Explain how it is superior to BJT. (7)
- (b). When a reverse gate voltage of $15 V$ is applied to a FET, the gate current is $10^{-3}\mu A$. Find the resistance between gate and source. (3)
3. (a). Define Hall Effect. Deduce an expression for Hall coefficient. Write the applications of Hall Effect. (7)
- (b). A semiconductor crystal of dimensions 12mm long, 5mm wide and 1mm thick has a magnetic field flux density of $0.5wb/m^2$ applied from front to back perpendicular to the largest faces. When a current of $20mA$ flows length wise through the specimen, the voltage measured across its width is found to be $37\mu V$. What is the Hall coefficient of this semiconductor? (3)

4. (a). Describe the formation of PN junction diode and deduce an expression for built in Potential barrier it. Write briefly about the Zener and avalanche breakdown mechanisms produced in a PN junction connected in a reverse bias. (7)

(b). Calculate built in potential barrier in a silicon PN junction at $T=300K$ for acceptor concentration $(N_a)=5 \times 10^{17}/cm^3$, donor concentration $(N_d)=10^{16}/cm^3$. (Boltzman constant, $k=1.38 \times 10^{-23} J/K$ and intrinsic carrier concentration n_i for silicon is $1.5 \times 10^{10}/cm^3$). 0.284 eV (3)

5. (a). What is a compensated semiconductor? Deduce an expression for electron and hole concentrations in a compensated semiconductor. (7)

(b). Write about degenerate and non-degenerate semiconductors. (3)

6. Write about the following devices. (3+3+4)

(a). Light emitting diodes

(b). Solar Cells

(c). Tunnel diode

Total No. of Pages 2
FIFTH SEMESTER
END SEMESTER EXAMINATION
EP 303(New Scheme) : ELECTROMAGNETIC THEORY, ANTENNA &
PROPAGATION

Time : 3.00 Hrs

Roll No.....
B.Tech. (Engineering Physics)
NOVEMBER 2018

Max. Marks : 40

Note : Attempt any five Questions

Assume suitable missing data, if any

1. (a) Explain with schematic diagram (4)
(i) Reflection Coefficient (ii) Transmission Coefficient
(b) A transmission line has a characteristic impedance of $50 + j0.01 \Omega$ and is terminated in a load impedance of $73 - j42.5 \Omega$. Calculate
(i) Reflection Coefficient (ii) Standing Wave Ratio. (4)

OR

- (a) Explain (i) Single stub matching (ii) double stub matching . Enumerate the advantages / disadvantages of each of these methods. (6)
(b) What are the applications of Smith Chart. (2)
2. (a) A rectangular waveguide measures 3×4.5 cm internally and has a 9GHz signal propagated in it. Calculate the cutoff wavelength and guide wavelength for TE_{10} mode. (2)
(b) Show that the solution of the Helmholtz equation in cylindrical coordinates (6)

$$\psi = \psi_0 J_n(K_c r) \cos(n\phi) e^{-j\beta_g z}$$

3. (a) Show that the dispersion relation for surface plasma waves (6)

$$k_z^2 = \frac{\omega^2}{c^2} \frac{2\epsilon_r \epsilon_{eff}}{\epsilon_r + \epsilon_{eff}}$$

- (b) Explain the phenomenon of ground wave, space wave and sky wave propagation. (2)

4. (a) What do you mean by (i) Radiation resistance (ii) Directivity (iii) Effective Area (iv) Half-Power Beam Width of an antenna. (5)
(b) Calculate the Maximum effective aperture of an antenna which is operating at a wavelength of 2 meters and has a directivity of 100. (3)

5. (a) What is an antenna arrays?. What are the reasons for using antenna arrays? Explain in detail the behaviour of broadside and end-fire arrays. (6)

- (b) Calculate the gain of an antenna with a circular aperture of diameter 3 meters at a frequency of 5GHz. (2)

6. (a) Discuss briefly the propagation of electromagnetic waves in ionosphere. Show that ionosphere behave as a medium of refractive index

$$n = \left(1 - \frac{81N}{f^2} \right)^{1/2} \quad (6)$$

- ~~6~~) Calculate the skip distance for flat earth with MUF of 10 MHz if the wave is reflected from a height of 300 km, where the maximum value of refractive index n is 0.9. (2)
- ~~7~~) (a) Write the Maxwell's equations in differential and integral form. Also give their physical significance. (4)
- ~~7~~) (b) The radiation resistance of an antenna is 72Ω and loss-resistance is 8Ω . What is the directivity, if the power gain is 16. (4)

$$N = \frac{R_L}{R_L + R_S}$$

Total no. of Pages: 02

End Term Exam
Fifth Semester

Roll no.....
35
Nov-2018
B.Tech.OEC

CO361 Database Management System

Duration: 3 Hrs.

Max Marks: 50

NOTE: Attempt all the questions. Assume the missing data if any.

Q1. a) Consider the following relational schema

employee(empno, name, office, age)

books(isbn, title, authors, publisher)

loan(empno, isbn, date)

Write the following queries in relational algebra.

- i) Find the names of employees who have borrowed a book published by TMH.
 - ii) Find the names of employees who have borrowed more than five different books published by TMH. (5)
- b) List the ACID properties. Explain the benefits of each with suitable example. (5)

Q2. (a) Use Armstrong's axioms to prove the soundness of the pseudotransitivity rule. (5)

(b) Compute the closure of the following set F of functional dependencies for relation schema

$$R = (A, B, C, D, E).$$

$$\begin{array}{l} A \rightarrow BC \\ CD \rightarrow E \\ B \rightarrow D \\ E \rightarrow A \end{array}$$

List the candidate keys for R. (5)

P.T.O.

- Q3.** a) When a transaction is rolled back in timestamp ordering, it is assigned a new timestamp. Explain the reason. (2)
b) What is the scheme used by the database system to recover from the deadlock state? (3)
c) What is cascadeless schedule? Why cascadelessness of schedules desirable? Explain your answer. (5)

- Q4.** a) Explain the use of Checkpoints in recovery scheme. (2)
b) What are advantages of rigorous two-phase locking protocol over other variants of two-phase locking? (3)
c) Discuss with example how updates are made in B^+ trees. (5)

Q5. Differentiate between: (4x2.5=10)

- a) Procedural and non-procedural DMLs
- b) Disjoint and overlapping generalization
- c) Sparse and dense Indexing
- d) Deferred and immediate log-based recovery

END

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Roll. No.....

B.TECH

1st SEMESTER

END SEMESTER EXAMINATION

Nov./Dec. 2018

HU-301 TECHNICAL COMMUNICATION

Time: 3.00 Hours

Max. Marks: 50

Note: Answer all the questions

Assume suitable missing data, if any.

1. Give synonyms for the following words: 5

Pallid, indolence, jejune, propitious, heretic

2. Write short notes on any three of the following: 15

- a) Nonverbal communication
- b) Barriers to communication
- c) Listening skills
- d) Type of reports

3. Write a resume for an engineer applying for a job in an MNC (imagine details). 10

4. Describe communication boosters for making an effective presentation 10

5. Discuss GD as a tool for assessment during placement session. 10

-END-

Total no. of pages: 2

Roll No.....
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FIFTH SEMESTER

B. Tech. [ALL]

END SEMESTER EXAMINATION

Nov/Dec- 2018

EP311 Computer Networks

Time: 3:00 Hours

Max. Marks: 50

Note: Answer any **FIVE** questions.

All questions carry equal marks. Drawn neat diagram wherever necessary. Assume suitable missing data, if any.

- 1 [A] With the help of a suitable block diagram explain concept of layered architecture of a computer network, showing node to node, hop to hop and layer to layer communication. [5]
[B] Draw the TCP/IP protocol and explain functions of each layer briefly [5]

- 2 [A] What is the need for Framing. Explain the various framing techniques available. [5]
[B] Taking selective repeat strategy as an example, explain the concept of flow control at data link layer. Assume 2 bit sequence numbers. [5]

- 3 [A] Given the following network addresses, find the class, the block, and the range of the addresses. Also represent the same in Classless format . [5]
 - i. 132.21.0.0
 - ii. 220.34.76.0
[B] What is the Network ID, subnet mask , broadcast address, First Usable IP and Last Usable IP on the subnet that a node 192.186.1.15/27 belongs to? If the given block was to be divided among four subnets determine the First and Last Usable IP of each subnet. [5]

mm

- 4 [A] Taking a small network as example, explain distance vector routing. [5]
- [B] How does Link state routing overcome the issues faced in distance vector routing? [5]
- 5 [A] Draw the datagram header format for IPv4, explaining the function of each fields. [5]
- [B] How is IPv6 and improvement over IPv4 ? [5]
- 6 [A] Compare the TCP and UDP header format and thereby justify their suitability for connection oriented/less protocol for process - to process communication. [5]
- [B] How do firewalls ensure the security of a computer network? [5]
- 7 Write short notes on **any TWO** [5X2]
- [A] The WWW, HTTP and FTP
- [B] The Domain Name System
- [C] Ethernet as a LAN standard

END

Total No. of pages: 2

Roll No. 35

V TH SEMESTER

B.Tech (ECE)

END SEMESTER EXAMINATION

Nov 2018

EC313 MICROPROCESSORS AND INTERFACING

Time : 3 Hrs

Maximum Marks: 40

Note: Question number 1. is compulsory. Attempt any 4 questions from the remaining. Assume missing data if any.

- 1 a. Explain the significance of dividing memory into Odd and Even Bank in case of 8086 Microprocessor 2
- b. Is it possible to change vector address of INTO? If possible, how? 2
- c. Explain Significance of Specific End of Interrupt command with respect to 8259 (Programmable Interrupt Controller) 2
- d. Write the control word to configure 8254 timer in mode 4 2
- 2 a. Differentiate between the following instructions 4
- CWD and DAS
 - SCASW EI:DX AX and STOSW EI:DX AX
 - TEST AL, 01 and CMP AL, 01
 - LEA AX [4326] and LES AX [4326]
- b. Write an assembly language program to calculate factorial of a given number 4
- 3 a. Write a far procedure to add fifty 16-bit numbers stored in consecutive memory location starting at displacement 0500H in DS = 0200H 4
- b. Write an assembly Language program search for an alphabet in the given string 4
- 4 a. Write an assembly language program to find the given string palindrome or not 4

- b** Write a near procedure that cubes the contents of the CX register. This procedure may not affect any register except CX. 4
- 5 a** Explain all modes of 8254 timer 4
- b** Write instructions to configure port A of 8255 as input port and Port B as output port. Write an assembly language program to read data from Port A and write it in Port B at an interval of 1 millisecond 4
- 6 a** Initialise 8251 in 8085A system with following specification 4
- i. Asynchronous mode with 300 baud
 - ii. 8 bit character length
 - iii. No parity
 - iv. 1.5 stop bits
 - v. Baud rate factor X16
- Assume that the address for 8251 ports are A0-A1
- b** Write an initialization routine for an 8259 (to be selected by addresses C0H and C1H) to set up for operation according to the following 4
- Non-Buffered system environment, Normal EOI, 8085A system, single 8259 operation Not in SFNM, CALL address interval equal to 4. First CALL address for IR0 must be FOOH. Also IR2 and IR3 must be masked
- ✓** Write short notes on any two 4+4
- i. Memory Paging
 - ii. Addressing modes of 8086
 - iii. 8086 interrupts
 - iv. Memory organization of 8086

---End---