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10EC/TE62

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Microprocessors

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO full questions from each part.***

PART – A

1 a. Explain with neat diagram, the programming model of the Intel 8086. **(07 Marks)**

b. What is real mode memory addressing? Describe the scheme with neat sketch. **(05 Marks)**

c. Generate the machine code for the following instructions: [opcode MOV ⇒ 1100011, 100011]

i) MOV WORD PTR [BX + 1000H], 4321H

ii) MOV BX, DS **(08 Marks)**

2 a. What is a segment override prefix, explain with an example. **(05 Marks)**

b. Define segment and offset addresses and determine the memory address accesses by each of the following instructions:

i) MOV AL, [1234H]

ii) MOV EAX, [BX]

Given: DS = 200H, BX = 300H and DI = 400H. **(06 Marks)**

c. What is addressing mode? Explain with an example any four memory addressing modes. **(09 Marks)**

3 a. Write an ALP to read a byte of number from key board and count the number of zeroes and ones store the result in ZC and OC respectively. **(10 Marks)**

b. Differentiate between the following pair of instructions with example:

i) CMP and SUB

ii) NOT and NEG

iii) AND and TEST. **(06 Marks)**

c. Whether the following instructions are valid or not, give reasons:

i) MOV CS, DS

ii) ADD BP, ES:[SP] **(04 Marks)**

4 a. Write an ALP to sort n number in descending order. **(10 Marks)**

b. List the conditional jump instructions that are used for signed numbers and explain. **(06 Marks)**

c. Explain DAA instruction with example. **(04 Marks)**

PART – B

5 a. Write an ALP to rotate stepper motor in anticlockwise direction by 10 rotations. **(08 Marks)**

b. With example distinguish macro and procedure. **(06 Marks)**

c. Explain the following pins:

i) INTR ii) NMI iii) $\overline{\text{INTA}}$ **(06 Marks)**

6 a. Explain with neat diagram, the internal architecture of 8087 arithmetic coprocessor. (10 Marks)
b. Explain with example the following instructions: i) FLD ii) FST iii) FISTP. (06 Marks)
c. Give the TAG register of 80 × 87 coprocessor. (04 Marks)

7 a. Describe with schematic, the minimum mode operation of 8086 processor. (10 Marks)
b. Explain how 8284 clock generator is connected to 8086 or 8088 microprocessor for the clock and reset signals. (10 Marks)

8 a. Describe in brief, the descriptor tables of 80386 and 80286. (10 Marks)
b. Explain the memory system of 80386 microprocessor. (06 Marks)
c. Compare 8086, 80286, 80386 and Pentium processors. (04 Marks)

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10EC63

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Microelectronics Circuits

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO full questions from each part.***

PART – A

1 a. Derive an expression for drain to source current from I-V characteristics for cut-off, triode and saturation regions of MOSFET. **(12 Marks)**

b. For a 0.8μm process technology with aspect ratio 10, t_{ox} = 8nm, $\mu_n = 450 \times 10^8$ $\mu m^2/vs$ and $v_t = 0.7V$

i) Find C_{ox} and K'_n

ii) Calculate the value of V_{GS} and $V_{DS(min)}$ needed to operate the transistor in the saturation region with a dc current $I_D = 100\mu A$.

iii) For the device to operate as 1000Ω resistor, find the values of V_{GS} required for very small V_{DS}. **(08 Marks)**

2 a. Consider a CS amplifier which has g_m = 2MA/V, r_O = 50KΩ, R_D = 10KΩ, R_G = 10MΩ, R_L = 20KΩ and R_{sig} = 500KΩ. Calculate R_{in}, G_v, A_v, A_{v_o} and R_{out}. **(10 Marks)**

b. Explain any three types of biasing methods in MOS amplifier circuits. **(10 Marks)**

3 a. Explain the operation of MOS current steering circuit and mention its advantages. **(10 Marks)**

b. Explain the two different types of scaling process of MOSFET in detail. **(10 Marks)**

4 a. Explain the CMOS implementations of CS amplifiers, also draw its I-V characteristics of active load and determine its small signal voltage gain. **(10 Marks)**

b. Explain the circuit of MOS cascade amplifiers and hence obtain an expression for short circuit transconductance. **(10 Marks)**

PART – B

5 a. Explain the operation of a MOS differential pair with common mode input voltage. **(08 Marks)**

b. Explain the operation of a two stage CMOS Op-Amp configuration. **(06 Marks)**

c. A MOS differential pair operated at a bias current of 0.8mA employs a transistors with W/L = 10 and $\mu_n co_x = K'_n = 0.2mA/v^2$ using R_D = 5KΩ and R_{SS} = 25KΩ. Find the differential gain, the common mode gain and the common mode rejection ratio (in dB) if the output is taken single ended and the circuit is perfectly matched. **(06 Marks)**

6 a. Explain the general structure of feedback amplifiers and also explain the properties of negative feedback. **(08 Marks)**

b. With relevant circuits of series-shunt feedback amplifier, derive the expression for input resistance and output resistance. **(08 Marks)**

c. Explain the effect of feedback on the amplifier poles. **(04 Marks)**

7 a. Draw the sample and hold circuit using Op-Amp and explain it. **(09 Marks)**

b. With neat circuit diagram, explain antilog amplifiers. **(06 Marks)**

c. Design a non-inverting amplifier with a gain of 2 at the maximum output voltage of 10V and the current in the voltage divider to be 10μA. **(05 Marks)**

8 a. Explain the pull-up and pull-down networks used in CMOS logic circuits. **(08 Marks)**

b. Explain the dynamic operation of a CMOS inverter. **(06 Marks)**

c. Implement $F = \overline{AB + CD}$ using AOI. **(06 Marks)**

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10EC64

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Antennas and Propagation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. Derive relationship between directive gain, effective length and radiation resistance. **(08 Marks)**

b. Determine the directivity for the following Intensity patterns :
i) $U = U_m \cos^2 \theta$ ii) $U = U_m \sin\theta \sin^2\phi$; $0 \le \theta \le \pi$, $0 \le \phi \le \pi$. **(06 Marks)**

c. Derive Power transfer ratio using Fris Transmission formula. **(06 Marks)**

2 a. Derive Maxima , Minima and Half power point directions in Array of 'n' elements with equal spacing and currents equal in magnitude with Progressive Phase Shift – End fire Array. **(10 Marks)**

b. Four isotropic sources are spaced $\lambda/6$ distance apart. They have a phase difference of $\pi/3$ between adjacent elements. Find BWFN and MPBW. **(10 Marks)**

3 a. Derive an expression for power radiation by current element of short dipole. **(06 Marks)**

b. Derive an expression for gain of a half wave Antenna. **(08 Marks)**

c. Explain characteristics of patch antenna. **(06 Marks)**

4 a. State Babinet's principle and explain how it gives rise to the concept of complementary antenna. **(07 Marks)**

b. Derive an expression for Directivity of Circular Loop Antenna. **(07 Marks)**

c. The diameter of circular loop antenna is 0.04λ. How many turns of the antenna will give a radiation resistance of 36Ω? **(06 Marks)**

PART - B

5 a. Derive an expression for pitch angle Axial ratio of helical antenna using perpendicular mode. **(06 Marks)**

b. What is basic concept of Reflector antenna? Explain different types of reflector antenna. **(06 Marks)**

c. Explain following antenna with neat sketch :
i) Sleeve Antennas ii) Omni directional Antennas. **(08 Marks)**

6 a. Explain in brief antenna for satellite communication. What are different design consideration Receiver and Transmitter case? **(10 Marks)**

b. Explain how GPR system differ than general radar systems. What are different considerations for antenna used in GPR systems? **(10 Marks)**

7 a. Derive an expression for Field strength at Receiver for Space wave propagation. **(07 Marks)**

b. Explain tropospheric scatter phenomenon. **(06 Marks)**

c. Define the following : i) Critical frequency (fc) ii) Maximum usable frequency (MUF) iii) Skip distance. **(07 Marks)**

8 a. Derive an expression for f_{MUF} for flat earth. **(10 Marks)**

b. In the ionospheric propagation , consider that the reflection takes place at a height 300km and that the maximum density in the ionosphere corresponds to a refraction index of 0.8 at a frequency is the MUF. Take the Earth's curvature into consideration. **(10 Marks)**

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10EC65

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What is OS? What are the common tasks performed by OS and when they are performed? **(06 Marks)**

b. Why are I/O bound programs given higher priorities in a multiprogramming environment illustrate with timing diagram? **(08 Marks)**

c. Explain partition based and pool based resource allocation strategies. **(06 Marks)**

2 a. With a neat diagram, explain the Kernal based OS structure. **(08 Marks)**

b. Explain with a figure the working of a two layered OS structure. **(08 Marks)**

c. What are the functions of an OS? Explain briefly. **(04 Marks)**

3 a. What are the advantages of threads over processes? **(03 Marks)**

b. Explain four fundamental states of process with state transition diagram. **(10 Marks)**

c. Explain with neat diagram user-level threads. **(07 Marks)**

4 a. Describe static and dynamic memory allocation. **(05 Marks)**

b. Explain first fit and best fit technique used to perform a fresh allocation from a free list. **(10 Marks)**

c. Compare contiguous and non-contiguous memory allocation. **(05 Marks)**

PART – B

5 a. Explain functions performed by paging hardware. **(06 Marks)**

b. Explain "page out daemon" for handling virtual memory in UNIX OS. **(04 Marks)**

c. Find the number of page faults for the following page reference string using FIFO and LRU page replacement policies assuming 3 frames.
Reference string: 5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5 **(10 Marks)**

6 a. With the help of a neat diagram, explain the working of a linked allocation of a disk space. **(08 Marks)**

b. Compare the sequential and direct file organization. **(04 Marks)**

c. Explain the interface between file system and IOCS. **(08 Marks)**

7 a. What are the functions of medium and short term schedulers? **(04 Marks)**

b. Compare preemptive and non preemptive scheduling. **(04 Marks)**

c. Describe the shortest request next (SRN) scheduling policy. Determine the average turnaround time and weighted turnaround time for the following set of processes shown below: **(12 Marks)**

Processes	P_1	P_2	P_3	P_4	P_5
Arrival time	0	2	3	4	8
Service time	3	3	5	2	3

8 a. Explain: (i) Direct and indirect naming (ii) Blocking and non blocking sends **(06 Marks)**

b. Describe buffering of interprocess messages. **(08 Marks)**

c. Write short notes on mailbox. **(06 Marks)**

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10EC661

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Analog and Mixed Mode VLSI Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain mixed signal layout strategy with schematic. **(10 Marks)**

b. Define the following with respect to ADC:
(i) Quantization error (ii) Integral non linearity (iii) Signal to noise ratio. **(06 Marks)**

c. Find the maximum sampling error for a sample and hold circuit that is sampling a sinusoidal input signal that could be described as $v_{in} = A \sin 2\pi ft$ where A = 2V and f = 100 kHz. Assume that aperture uncertainty is equal to 0.5 ns. **(04 Marks)**

2 a. Explain simple resister string DAC. List its advantages and disadvantages. **(06 Marks)**

b. Discuss charge scaling DAC with block diagram. **(07 Marks)**

c. Explain with block diagram cyclic digital to analog converter. **(07 Marks)**

3 a. Discuss with block diagram successive approximation ADC algorithm **(08 Marks)**

b. Write the block diagram of two step flash ADC. List its conversion process. **(06 Marks)**

c. Explain pipeline ADC with block schematic. **(06 Marks)**

4 a. Explain the operation four Quadrant analog multiplier. **(06 Marks)**

b. Explain high performance voltage comparator with block diagram. **(08 Marks)**

c. Discuss level shifting concepts using P-channel source follower. **(06 Marks)**

PART – B

5 a. Sketch the block level circuit diagram for an $f_{s/4}$ digital resonator. **(04 Marks)**

b. Determine the frequency response of a digital system with the time domain response
$y[nT_s] = x[nT_s] + y[(n-1)T_s]$
Sketch the hardware implementation of the system and its frequency response. **(08 Marks)**

c. Explain accumulate and dump circuit used for decimation and averaging. Also find the frequency response for different value of k. **(08 Marks)**

6 a. Discuss simple delay element using pass transistor and CMOS inverters. **(06 Marks)**

b. Sketch and explain briefly circuit diagram of 4 bit pipelined adder. **(06 Marks)**

c. Summarize the submicron CMOS process flow. **(08 Marks)**

7 a. Discuss the biasing concerns in case of analog circuit design. **(10 Marks)**

b. Implement binary-weighted current mirror using a W – 2W topology. **(06 Marks)**

c. Write a short note on MOSFET switch. **(04 Marks)**

8 a. Discuss the design of mixed signal opAMP using basic topology. **(12 Marks)**

b. Explain with circuit diagram biasing a push pull output stage with floating current source. **(08 Marks)**

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10EC662

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Satellite Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain the regions and frequency planning along with frequency band designations for satellite communication. **(06 Marks)**

b. Explain briefly about various satellite communication services. **(06 Marks)**

c. Explain about the series of INTELSAT. **(08 Marks)**

2 a. State and explain Kepler's three laws of planetary motion with suitable equations and diagrams. **(10 Marks)**

b. Calculate the apogee and perigee heights for the orbital parameters given as – ρ = 0.0014053, Mean Motion NN = 14.22296917rev/day, $\mu = 3.986005 \times 10^{14} m^3/sec^3$, assume mean radius of earth R_P = 6371km. **(05 Marks)**

c. What is meant by sidereal time? Explain. **(05 Marks)**

3 a. Explain the atmospheric and ionospheric losses that occur in satellite communication. **(06 Marks)**

b. Deduce the equation for combined uplink and downlink C/N ratio. **(04 Marks)**

c. Calculate for frequency of 12 GHz and for horizontal and vertical and circular polarizations, the rain attenuation which is exceeded for 0.01 percent of the time in any year, for a point rain rate of 10mm/h. The earth station attitude is 600m, and the antenna elevation angles is 50°. The rain height is 3km. **(10 Marks)**

4 a. What is the purpose of altitude control for the satellites? Explain the methods of altitude control. **(10 Marks)**

b. Explain in detail a typical transponder channel arrangement in C-band used in satellite communication. **(06 Marks)**

c. Explain the routine functions performed by TT and C subsystem aboard the spacecraft. **(04 Marks)**

PART – B

5 a. With a neat block diagram explain outdoor and the indoor unit for direct broadcast satellite system for TV. **(10 Marks)**

b. With the help of block diagram explain the working of MATV system. Compare CATV and MATV system. **(10 Marks)**

6 a. Explain all the possible modes of interference between satellite circuits and terrestrial station. **(10 Marks)**

b. Explain the channeling arrangement and operation multiple access for spade (SCPC) system. **(10 Marks)**

7 a. Explain the following : i) Transponder capacity ii) Bit rates for digital TV ii) Frequency and polarization. **(10 Marks)**

b. Explain the different types of mobile satellite services. **(10 Marks)**

8 Write short notes on :

a. Radar sat applications

b. Global Positioning Satellite System (GPS)

c. VAST

d. Antenna look angles. **(20 Marks)**

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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10EC/TE61

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Digital Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO full questions from each part.***

PART – A

1 a. What is natural sampling? Explain its implementation using both time domain and frequency domain analysis. **(08 Marks)**

b. A signal g(t) = 10cos20πt cos200πt is ideally sampled at a rate of 250 samples/sec. Determine the spectrum of the sampled signal. Specify the cut off frequency of ideal reconstruction filter to recover the signal g(t) from its sampled version. **(06 Marks)**

c. Four messages W, W, W and 3W are to be time division multiplexed with 'W' being '2000'. Set up the TDM scheme and find the speed of commutator and also calculate the transmission bandwidth. **(06 Marks)**

2 a. Derive an expression for the output signal to quantization noise ratio of a uniform quantiser of midtread type. Assuming a loading factor of 4 is the quantiser show that $(SNR)_0 = 6n - 7.2db$ where 'n' is the number of bits per sample. **(08 Marks)**

b. What is a regenerative repeater? With block diagram, explain the 3 main operations of regenerative repeater. **(06 Marks)**

c. A signal of bandwidth 3.4K is converted to PCM bit stream with 1024 levels. Determine the number of bits/sec generated by PCM. Assume that signal is sampled at 20% above Nyquist rate. **(06 Marks)**

3 a. Explain briefly the basic operation of a delta modulator system. **(06 Marks)**

b. Derive the power spectral density of NRZ polar binary data. **(06 Marks)**

c. For a sinusoidal modulating signal $x(t) = A_0\cos(2\pi f_0 t)$, show that the output signal to quantizing noise ratio in a delta modulated system under the assumption of no slope overload error is given by

$$(SNR)_0 = \frac{3f_s^3}{8\pi^2 f_0^2 f_m}$$

f_s = sampling frequency

f_m = cut off frequency of LPF in receiver. **(08 Marks)**

4 a. Derive Nyquist criterion for distortion less baseband binary transmission and mention its practical limitation and solution to it. **(10 Marks)**

b. Binary data 00110111 is applied to input of duobinary system with precoder. Construct the precoder o/p, duobinary coder output and corresponding receiver output for initial bit 'O'. Suppose due to error during transmission, the level produced by second digit is reduced to zero. Construct the new receiver output compare the receiver output with and without error and comment. **(06 Marks)**

c. Write a brief note on eye pattern. **(04 Marks)**

PART – B

5 a. Derive an expression for the probability of error in coherent detection of binary FSK. **(10 Marks)**

b. A binary data is transmitted over AWGN channel using binary PSK at a rate of 1 megabits/s. It is desired to have $P_e < 10^{-4}$. Noise PSD is 10^{-12} w/hz. Determine average carrier power required at receiver input if detection is coherent type. [Given $(\text{erf}\sqrt{2.5}) = 0.9998$)]. **(04 Marks)**

c. Explain QPSK transmitter and receiver with neat block diagram followed by waveforms and equations. **(06 Marks)**

6 a. What is the significance of Gram Schmidt orthogonalization procedure? Apply GS for the following signals and obtain the respective orthonormal basis functions.

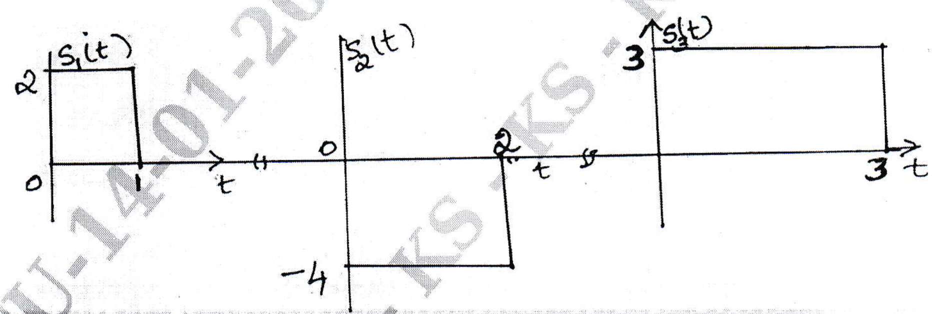

Fig.Q.6(a) **(10 Marks)**

b. Show that for a noisy input, the mean value of j^{th} correlator output x_j depends only on the signal S_{ij} and all the correlators output x_j $j = 1, 2 \ldots N$ have variance equal to PSD No/2 of AWGN and covariance of the correlator is zero. **(10 Marks)**

7 a. What is optimum receiver with respect to digital modulation scheme? Draw the schematic of correlation receiver and explain its features. **(08 Marks)**

b. Derive an expression for impulse response of matched filter while maximizing its signal to noise ratio at the output. **(06 Marks)**

c. Obtain the output of a matched filter if the input s(t) is a rectangular pulse of amplitude 'A' and duration 'T'. **(06 Marks)**

8 a. What is spread spectrum technique mention its applications and features? **(06 Marks)**

b. Explain the properties of PN sequences with suitable examples. **(09 Marks)**

c. Explain the slow frequency hopping spread spectrum using block diagram. **(05 Marks)**

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10TE63

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Antennas and Propagation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Derive an expression for the maximum effective aperture and directivity. **(08 Marks)**

b. State and prove FRISS transmission formula for radio communication link. **(08 Marks)**

c. A radio link has a 26 Watts transmitter connected to an antenna of 1.8 m^2 effective aperture at 5 GHz. The receiving antenna has an effective aperture of 0.7 m^2 and is located at 10 km. Find the power delivered to the receiver. **(04 Marks)**

2 a. Derive an expression and draw the field pattern for 2 isotropic point sources of the same amplitude and same phase. **(10 Marks)**

b. Show that the directivity for unidirectional operation is $2(n + 1)$ for an intensity variation of $U = U_m \cos^n \theta$. Also verity the expression for $n = 3$ and compare with the exact directivity. **(07 Marks)**

c. State and prove power theorem. **(03 Marks)**

3 a. Derive the expression for the far field pattern of thin linear antenna. **(10 Marks)**

b. Derive the radiation resistance of $\lambda/2$ dipole. **(10 Marks)**

4 a. Explain Babinet's principle with illustrations. **(05 Marks)**

b. Write a note on patch antenna. **(05 Marks)**

c. Derive the expression for radiation resistance of loop antenna and also find directivity of small loop and large loop. **(10 Marks)**

PART – B

5 a. With neat sketch, explain the design criteria of horn antenna. **(06 Marks)**

b. Calculate directivity of rectangular horn antenna whose height of 78 cm and width of the mouth 8 cm. It operates at 9.6 GHz. Take Aperture efficiency η as 68%. **(04 Marks)**

c. Explain the design of log periodic antenna and analyze the three regions of log periodic antenna. **(10 Marks)**

6 a. Explain a Yagi-Uda antenna structure with a neat diagram. **(06 Marks)**

b. Design a 3 element Yagi-Uda antenna to operate at a frequency of 225 MHz. **(04 Marks)**

c. Write a note on turnstile antenna and antennas for Ground Penetrating Radars. **(10 Marks)**

7 a. With a neat sketch, explain and derive an expression for skip distance in terms of critical frequency and the maximum userable frequency f_{MUF}. **(10 Marks)**

b. Define critical frequency and virtual height with sketches. **(06 Marks)**

c. Calculate the critical frequency for reflection at vertical incidence if the maximum electron density is $1.52 \times 10^6/cm^3$. **(04 Marks)**

8 a. Draw and explain the characteristics of different ionized layers. **(10 Marks)**

b. Derive an expression for the refractive index of ionosphere. **(06 Marks)**

c. A HF radio link is established for a range of 2500 km. If the reflection region of the ionosphere is at a height of 250 km and has a critical frequency of 7 MHz. Calculate maximum userable frequency f_{MUF}. **(04 Marks)**

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10TE64

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Microwave & Radar

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Derive transmission line equations by the methods of distributed circuit theory. **(09 Marks)**

b. Define reflection coefficient and derive an expression for reflection coefficient at the load in terms of load impedance. **(05 Marks)**

c. A load impedance of $Z_L = 60 - j80\,\Omega$ is required to be matched to a 50 Ω coaxial line by using a short circuit stub of length 'l' and a distance 'd' from the load. The wavelength is 1 m. Determine the position and length of the stub. Use Smith chart. **(06 Marks)**

2 a. Briefly explain the following microwave devices :

(i) Hybrid ring

(ii) Two hole directional coupler. **(10 Marks)**

b. Write field components of TE_{10} mode inside a rectangular waveguide. Using this, derive the equation for power transmitted through the guide for the dominant mode in z-direction. **(10 Marks)**

3 a. Explain construction and operation of Gunn diode in the Gunn mode and LSA mode. **(10 Marks)**

b. With neat diagram, explain the construction operation of IMPATT diode and mechanism of oscillations. **(10 Marks)**

4 a. What are the advantages of [S] matrices over [Z] matrices? **(06 Marks)**

b. List the common properties for [S] and [Z] matrices. **(04 Marks)**

c. Define insertion loss, transmission loss, return loss in terms of S-parameters. **(10 Marks)**

PART – B

5 a. With a neat diagram, explain the working of precision type phase shifter. **(10 Marks)**

b. With a neat diagram, explain the working of a H-plane Tee junction. Also derive the S-matrix. **(10 Marks)**

6 a. Explain the construction and field pattern for microstrip line. **(06 Marks)**

b. Discuss the different losses in a microstrip line. **(08 Marks)**

c. Compare strip line and microstrip line. **(06 Marks)**

7 a. Define following terms related to RADAR : (i) Range to a RADAR (ii) Maximum Unambigous range. **(04 Marks)**

b. Derive the expression for the simple form of the maximum range of radar. Comment on radar range equation. **(08 Marks)**

c. State and briefly explain applications of RADAR. **(05 Marks)**

d. A 10 GHz RADAR has the following characteristics :
Peak transmitted power = P_t = 250 kW ;
Peak gain of antenna = G = 2500;
Minimum detectable peak signal power by the receiver = $S_{min} = 10^{-14}$ w
Radar cross section of the target = $\sigma = 2\ m^2$
Cross sectional area of the radar antenna $A_e = 10\ m^2$
Find the maximum range (R_{max}) possible. **(03 Marks)**

8 a. With the aid of a block diagram, explain fully the operation of an MTI radar system using a power amplifier in the transmitter. **(12 Marks)**

b. What is Doppler effect? **(04 Marks)**

c. What are the advantages offered by digital MTI processing? **(04 Marks)**

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