B. I. T. Sindri, Dhanbad

MID TERM - I EXAMINATION 2024

B. Tech VII[th] Semester: ECE

Subject : Satellite Communication

Total Marks: 20

Total Time: 1.5 Hours

Attempt any FIVE questions. Q1 is compulsory. All questions carry Equal marks.

Q. No.	Questions	Marks	CO	B. T. (Level)
1.	(i) The down link frequency in the C band transponder is A. 6 GHz B. 4 GHz C. 14 GHz D. 11 GHz (ii) Calculate the radius of a circular orbit for which the period is 1 day? A. 42.241 KM B. 42.241 m C. 4.241 KM D. 2.241 KM (iii) A typical signal strength received from a geosynchronous communication satellite is of the order of a few A. milliwatts B. kilowatts C. picowatts D. watts (iv) A satellite may carry _____ transponders A. 32 B. 41 C. 24 D. 64	4	1	1 & 2
2.	**Explain** Kepler's law of planetary motion with a neat diagram.	4	1	2
3.	**Describe** elevation and azimuthal angle calculation of satellite.	4	2	2
4.	**Define** (i) Orbital Perturbations and (ii) Look Angles.	4	3	2
5.	With a neat block diagram, **explain** the attitude and orbit control system present in the space segment.	4	3	3
6.	**Discuss** using diagrams about the mechanism of launching a satellite.	4	2	2
7.	Determine the orbital eccentricity, semi-major axis, semi-minor axis of an eccentric elliptical orbit of a satellite with an apogee and perigee points at a distance of 50,000 KM and 8 KM..	4	1	3

BIT Sindri
Course : Antenna & Wave Propagation
ECE-7th Semester (2024)
Mid Sem – I

Full Marks:20 **Date: 26.10.2024**
Time: 1½ Hr

Question No. 1 is compulsory

Question No	Question	Marks	CO	Bloom's Level
1	i) Which pattern is generated due to plotting of square of amplitude of an electric field? a. Field Pattern b. Voltage Pattern c. Power Pattern d. All of the above	1	CO1	BT1 (Remembering)
	ii) **Which** among the following defines the angular distance between two points on each side of major lobe especially when the radiation drops to 3 dB? **a.** Half power beam width (HPBW) **b.** First null beam width (FNBW) **c.** Side lobe level (SLL) **d.** Front to back ratio (FBR)	1		
	iii) **What** is the far-field position of an electric short dipole? a. Along x-axis b. Along y-axis c. Along z-axis d. Along xy plane	1	CO2	
	iv) Dipole antenna is symmetrical in nature **where** the two ends are at equal potentials with respect to point a. Initial b. Eventual c. Mid d. None of the above	1		
Answer any 2 questions from Question Nos. 2, 3 and 4				
2	Write short notes on Antenna Resistance.	4	CO1	BT1 (Remembering)
3	**Describe** FRISS transmission formula.	4	CO1	BT2 (Understanding)
4	**Define** beam efficiency of antenna and antenna temperature.	2 2	CO1	BT1 (Remembering)
Answer any 2 questions from Question Nos. 5, 6 and 7				
5	**Derive** the radiation resistance of a Hertzian dipole.	4	CO2	L2 (Understanding)
6	**Calculate** the radiation resistance of a $\lambda/20$ dipole in free space.	4	CO2	L3 (Applying)
7	Write short notes on vector magnetic potential	4	CO2	BT2 (Understanding)

BIT Sindri

Course : Optical Fiber Communication (ECC701)

ECE– 7th Semester (2024)

Mid Sem – I

Date: 24.10.2024

Full Marks:20 **Time: 1½ Hr**

Question No. 1 is compulsory

Question No	Question	Marks	CO	Bloom's Level
1	(A) Multimode step index fiber has (I)Large core diameter & large numerical aperture (ii)Large core diameter & small numerical aperture (iii)Small core diameter & large numerical aperture (iv)Small core diameter & small numerical aperture	1	1	BT1 (Remembering)
	(B) Light incident on fibers of angles _____ the acceptance angle does not propagate into the fiber. (I)Less than (ii)Greater than (iii)Equal to (iv)Less than and equal to	1		
	(C) In APD receiver the Dark current and Quantum noise are (a) Increased by multiplication process (b) Increased by Addition process (c) Decreased by division process (d) Decreased by subtraction process	1	2	
	(D) In p-i-n photodiode, absorption takes place in (a)p-region (b)n-region (c)metal contact (d)depletion region	1		
	Answer any 2 questions from Nos. 2, 3 and 4			
2	**Sketch** a block diagram of fiber optic communication system and **describe** the function of each component.	4	1	BT2 (Understanding)
3	A step index fiber has a core index of refraction of n_1 = 1.425. The cut-off angle for light entering the fiber from air is found to be 8.50° . **Determine** the numerical aperture of the fiber and the index of refraction of the cladding of this fiber?	4	1	BT3 (Applying)
4	Explain the modulation of LED. Also, describe the drive circuits used in modulation of LED and LASER diode.	4	1	BT2 (Understanding)
	Answer any 2 questions from Nos. 5, 6 and 7			
5	**What** are the constructional requirements for a good photo diode? With a neat **sketch, describe** the features of a PIN photodiode and **explain** its working.	4	2	BT2 (Understanding)
6	**What** is photomultiplication. **Explain** the construction and working of APD photodiode with proper diagram.	4	2	BT2 (Understanding)
7	**Calculate** the responsivity of a p-i-n photodiode at 1.3 and 1.55 μm if the quantum efficiency is 80%. **Why** is the photodiode more responsive at 1.55 μm?	4	2	BT3 (Apply)

Department of Electronics & Communication Engineering
BIT Sindri,Dhanbad-828123

Mid-Term-I
(Session-2024-25)

Course Name: 5G Communication
Branch : ECE (7th Semester)

Maximum Marks: 20
Time Allowed: 1hrs.30 min.

Instructions:

1. All Questions carry equal marks.
2. Attempt any five questions.

Q.N.	Question	Marks	CO	Bloom's Level
1.	(a) What are the requirements of 5G communication? (b) Compare 1G to 5G on the basis of power consumption, data rate and coverage area.	2 2	1	2 3
2.	(i) Derive expression for power received in free space transmission model of wireless propagation channel and also express in dB. (ii) In free space model if power received at a distance of 100m is -24.5dBm then calculate the power received at 10 km in dBm?	2 2	1 1	3 3
3.	(i) Explain Two-Ray Ground reflection model of wireless propagation channel. Also mention the critical distance in terms of transmitting and receiving antenna after which the received power falls off fourth raised of distance rather square of the distance between transmitter and receiver. (ii) Determine the critical distance in urban microcell (h_t= 10m, h_r=3m) and indoor microcell (h_t= 3m, h_r=2m) for f_c= 2GHz.	2 2	1 1	3 5
4.	(i) Why do we prefer multicarrier modulation over single carrier modulation in 5G? (ii) How and how much bandwidth of transmission can be saved when OFDM is used? Explain.	2 2	3 3	3 2
5.	(i) Explain OFDM. (ii) Compare the required bandwidth of a multicarrier system with overlapping subchannels versus non-overlapping subchannels (OFDM) using the following parameters (assume no guard band for non-overlapping subchannels) for TN=1/5kHz, N=256 and raised cosine pulses with α=1.	2 2	3	3 5
6.	(i)Why do require Filter bank at receiver side in multicarrier modulation scheme? (ii) What are the advantages of OFDM on overlapping multicarrier system?	2 2	3	3
7.	Explain different type of multiple access techniques used in 5G communication.	4	3	2

B. I. T. Sindri, Dhanbad

1st MID TERM EXAMINATION 2024

B. Tech VII[th] Semester: ECE — Subject : Low Power VLSI Circuits

Total Marks: 20 — Total Time: 1.5 Hours

Attempt any FIVE questions. Q1 is compulsory. All questions carry Equal marks.

Q. No.	Questions	Marks	CO	Bloom's Taxonomy (Level)
1.	(i) The subthreshold leakage current in a CMOS transistor increases with: a) Decrease in supply voltage b) Increase in channel length c) Decrease in temperature d) Increase in gate oxide thickness (ii) Gate leakage current in a CMOS transistor is primarily due to: a) Tunneling through the gate oxide b) Diffusion through the channel c) Carrier generation in the depletion region d) None of the above (iii) Leakage power in SRAMs is primarily due to: a) Subthreshold leakage current b) Gate leakage current c) Junction leakage current d) All of the above (iv) The dominant source of power dissipation in DRAMs is: a) Refresh power b) Sense amplifier power c) Bitline precharge power d) All of the above	4	1 & 4	2
2.	**Discuss** the concept of static power dissipation in detail. How does it differ from active power dissipation? **Explain** the various factors that contribute to static power dissipation and the techniques used to minimize it.	4	1	2
3.	**Explore** various circuit techniques used to reduce leakage power in CMOS circuits. **Discuss** the advantages and disadvantages of each technique and their applicability in different design scenarios.	4	1	2
4.	**Describe** the phenomenon of active power dissipation in CMOS circuits. **Derive** the equation for active power dissipation and explain its dependence on various circuit parameters. Discuss the impact of supply voltage scaling and switching frequency on active power dissipation.	4	1	3
5.	**Explain** the difference between SRAM and DRAM in terms of their structure, operation, and power consumption characteristics.	2	4	2
6.	**Discuss** the primary sources of power dissipation in SRAM circuits. How do these sources differ from the power dissipation in DRAMs?	2	4	2
7.	**Discuss** the major sources of power dissipation in DRAM circuits. How does refresh power contribute to the overall power consumption of DRAMs?	4	4	2