

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI

Summer Examination 2020

HVPM's College of Engineering and Technology, Amravati

Department of Electronics & Telecommunication Engineering

Bachelor of Engineering Sem :- VII

Subject: SOFC

Code: 7XT4

Instructions:

- 1) Solve any two questions
 - 2) All questions carry equal marks
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Que 1.		
a	State and prove Kepler's third law.	2 credit point
b	Explain in brief the concept of noise temperature in satellite link with the help of necessary expression.	2 credit point
c	Explain in brief two-way implementation architecture for VSAT network.	2 credit point
d	Explain with the help of neat diagram the light propagation in parabolic profile graded index fiber. Also state no of supported modes. Enlist the advantages of graded index multimode fiber over step index multimode fiber.	2 credit point
e	Discuss the mechanism of optical feedback to provide oscillation and hence amplification within the laser.	1 credit point
f	Explain wavelength division multiplexing.	1 credit point
Que. 2		
a	Explain in brief Solar Eclipse.	2 credit point
b	Discuss the various parameter to be considered while designing a downloading budget in satellite communication system.	2 credit point
c	Explain in brief the satellite signal acquisition in GPS.	2 credit point
d	When the mean optical power launched into 8km length of the fiber is $120\mu\text{W}$, the mean optical power at the fiber output is $3\mu\text{W}$. determine 1) overall signal attenuation in dB, assuming no connectors and splices in between. 2) the signal attenuation per kilometer of the fiber 3) the overall signal attenuation for a 10 km optical link using the same fiber with splices at 1Km interval, each giving attenuation of 1dB.	2 credit point
e	A germanium p—i—n photodiode with active dimensions of 100 x 50 It has a quantum efficiency of 55% when operating at a wavelength of 1.3 The measured dark current at this wavelength is 8 nA. Calculate the noise equivalent power and specific detectivity for the device	1 credit point
f	Describe with the help of suitable block diagram, the operation of an optical fiber regenerative repeater. Indicate reasons for the occurrence of bit errors in the regeneration process and outline a technique for establishing the quality of channel	1 credit point
Que. 3		
a	Explain in brief doppler shift.	2 credit point

b	A satellite system has a 4db receiver with the following gains and noise temperature $T_{in} = 25K$, $T_{RF} = 50 K$, $T_{IF} = 1000 K$, $T_m = 500K$, $G_{RF} = 23dB$, $G_{IF} = 30dB$. Calculate the system noise temperature, assuming the mixer has a gain $G_m = 0dB$. Recalculate the system noise temperature when the mixer has 10 dB loss. How can the noise temperature of the receiver be minimized when the mixer has a loss of 10 dB?	2 credit point
c	Explain in brief the principle of GPS position location.	2 credit point
d	Explain with the help of neat diagram, the macrobending and microbending losses in optical fiber.	2 credit point
e	Derive an expression for the coupling efficiency of a surface emitting LED into a step index fiber, assuming the device to have a Lambertian output.	1 credit point
f	A digital optical fiber system uses an Return to zero (RZ) pulse format. Show that the maximum bit rate for the system $BT(max)$ may be estimated using expression. $BT(max) = 0.35 / T_{syst}$ where T_{syst} is total system rise time.	1 credit point
Que. 4		
a	A satellite in an elliptical orbit has a perigee of 1000 Km and an apogee of 4000 km. using mean earth radius of 6378.14 km, find the period of the orbit in hours, minutes and seconds. also find the eccentricity of the orbit (given that $\mu = 3.986004418 \times 10^5$)	2 credit point
b	A satellite is operated at an EIRP of 56 dB W with an output back off BO of 6 dB. The transmitter feeder losses amount to 2dB and the antenna gain is 50 dB. Calculate the power output of TWT amplifier required for full saturated EIRP.	2 credit point
c	Explain with the help of neat diagram the principle of operation of VSAT earth station.	2 credit point
d	A relative refractive index difference for an optical fiber, designed for long distance transmission is 1%. Estimate the numerical aperture and solid acceptance angle in air for the fiber when the core refractive index is 1.46. Further calculate the critical angle at core cladding interface within the fiber.	2 credit point
e	Define the quantum efficiency and responsivity of a photodetector. Derive an expression for responsivity of an intrinsic photodetector in terms of the quantum efficiency of the device and the wavelength of the incident radiation	1 credit point
f	Develop a relationship between the error probability and the received SNR for a baseband binary optical fiber system. Assume that number of ones and zeros are equiprobable and that the decision threshold is set midway between the one and zero level	1 credit point