	Utech
Name :	A
Roll No.:	To Owner (5' Exercisings 2nd Explained
Invigilator's Signature :	

CS/B.Tech (ECE)/SEP. SUPPLE/SEM-8/EC-802/2012 2012

ADVANCED COMMUNICATION SYSTEM

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

- 1. Choose the correct alternatives for any ten of the following: $10 \times 1 = 10$
 - i) In a GSM network, MTSO stands for
 - a) main terminal switching order
 - b) matrix terminal system office
 - c) mobile telephone switching office
 - d) mobile terminal system & others.
 - ii) In mobile communication a control channel is used from a land station to mobile station. It is called
 - a) FDCC

b) FVC

c) RECC

d) RVC.

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iii)	Near far problem occurs in			
	a)	TDMA	b)	FDMA Transfer particular
	c)	CDMA	d)	CSMA.
iv)	For	or the hexagonal cell geometry of seven cell cluster the		
	co-channel reuse ratio $Q = D/R$ is			
	a)	3	b)	4.58
	c)	5.2	d)	6.
v)	The frequency of SAT (Supervisory Audio Tone) is			
	a)	12 kHz	b)	3 kHz
	c)	6 kHz	d)	10·4 kHz.
vi)	The	The term 'single mode' and 'multi mode' are best desired		
	as			
	a)	the number of fibres placed into fibre optic cable		
	b) the number of voice channels each fibre can support			
	c) the number of wavelengths each fibre can support			
	d)	the index number.		
vii)	A step index fibre in air has a numerical aperture of			
	0.16, core refractive index 1.45 and core diameter			
	$60 \mu m$. The normalized frequency for the fibre is			

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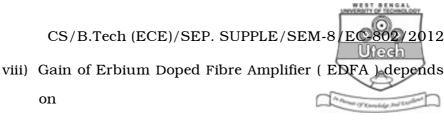
60.28

c) 64·2

a)

b) 62·26

d) 63·42.



- a) pump power
- b) both pump power & fibre length
- c) signal power
- d) none of these.
- ix) When the size of density fluctuation is less than 1/10 of the operating wavelength of light then it is known as
 - a) Mie scattering
 - b) Rayleigh scattering
 - c) Stimulated Brillouin scattering
 - d) Stimulated Raman scattering.
- x) The core diameter of single mode fibre is
 - a) 3-5 microns
 - b) 8-10 microns
 - c) 12-15 microns
 - d) 1-6 microns.

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- xi) The lowest frequency used in satellite communication is
 - a) 0.8 GHz
- b) 3 GHz
- c) 18 GHz
- d) 30 GHz.
- xii) The distance of a synchronous satellite from earth surface is
 - a) 300 km
- b) 10000 km
- c) 35900 km
- d) 5 km.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following.

 $3 \times 5 = 15$

- 2. a) What do you understand by responsivity of a photodetector?
 - b) A photodiode has a quantum efficiency of 65% when photons of energy 1.5×10^{-19} J are incident upon it. At what wavelength is the photodiode operating? Calculate the incident optical power required to obtain a photocurrent of $2.5~\mu$ amps when the photodiode is operating as described above. 2+3
- 3. a) Describe briefly the propagation of meridional ray, skew ray and evanescent wave.
 - b) Write the formula of cut off wavelength in case of single mode fibre having refractive index $n_{1 \text{ core}}$ and $n_{2 \text{ cladding}}$ and normalized cut off frequency $2 \cdot 045$.

3 + 2

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- 4. Explain the function of HLR, VLR, OMC and AUC during call set up.
- 5. What is perturbation ? How does it effect satellite communication ? 1+4
- 6. Describe the following methods in a typical call flow for GSM standard: 2+3
 - a) Location update
 - b) Call origination.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- 7. a) Discuss the direct and indirect band gap semiconductor.
 - b) Draw the injection current *vs* emitted power curve of LED and LASER. Why LASER is more suitable in long haul optical communication?
 - c) Draw suitable driver circuit for analogue modulation of LED.
 - d) The radiative and non-radative recombination lifetime of the minority carriers in the active region of a double hetero-junction LED are 60 ns and 100 ns respectively. determine
 - i) the total carrier recombination lifetime and
 - ii) the power internally generated within the device when peak emission wavelength is $0.87~\mu m$ at a drive current of 40 mA. 4+4+2+5

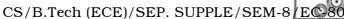
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- 8. a) What is orbital perturbation? How does it affect satellite communication? What are geosynchronous and geostationary orbits? What is sub-satellite point?
 - b) Derive the expression for orbital velocity of a satellite.

10 + 5

- 9. a) Write Kepler's laws of planetary motion. What do you mean by parking of a satellite?
 - b) Why is uplink frequency greater than downlink frequency in satellite communication? What are the advantages of cassegrain field?
- 10. a) Explain the methods which are applied to reduce the interference in cellular communication system.
 - b) Explain frequency reuse.
 - c) Determine the distance from the nearest co-channel for a cell of radius 0.64 km and a co-channel reuse factor of 12. 6+4+5

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- 11. Write short notes on any three of the following:
- $3 \times 5 = 15$

- a) Chromatic dispersion
- b) Avalanche photodiode
- c) Software defined ratio
- d) Bluetooth
- e) 3G over 2G wireless network.

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