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CBCS SCHEME

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BEC515D

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2026
Satellite and Optical Communication

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define the following : i) Orbit and trajectory ii) Ascending and descending nodes in an orbit iii) Apogee and perigee distance iv) Semimajor and semiminor axis v) Equinoxes.	10	L1	CO1
	b.	Explain the different types of satellite orbits.	10	L2	CO1
		OR			
Q.2	a.	Explain three Keplers law of planetary motion.	10	L2	CO1
	b.	Explain satellite spin stabilization technique employed for altitude control of a satellite.	6	L2	CO1
	c.	A satellite is moving in an elliptical orbit with the major axis equal to 42000 Km. If the perigee distance is 8000 Km, find the apogee and the orbit eccentricity.	4	L2	CO1
		Module – 2			
Q.3	a.	With a neat block schematic arrangement, explain a regulated bus power supply system also discuss types of power systems.	10	L2	CO2
	b.	Explain Tracking Telemetry and Command Subsystem using a neat block schematic.	10	L2	CO2
		OR			
Q.4	a.	With a neat schematic, explain generalized earth station.	6	L2	CO2
	b.	Explain Monopulse Satellite Tracking.	4	L2	CO2
	c.	With neat sketch, explain different types of earth station antennas used in satellite communication.	10	L2	CO2
		Module – 3			
Q.5	a.	Define Transponder. Explain the types of transponder used in satellite.	10	L2	CO3
	b.	Explain the advantages and disadvantages of satellite network over terrestrial networks.	10	L2	CO3

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		OR			
Q.6	**a.**	With neat sketch, explain typical satellite TV network.	**10**	**L2**	**CO3**
	b.	Discuss Regional satellite system and National Satellite System.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Derive the equation of Numerical Aperture considering the ray path for meridional ray in optical fiber.	**8**	**L2**	**CO4**
	b.	Explain fiber bending loss with neat diagram write equation of critical radius of curvature for multimode and single mode fibers.	**8**	**L2**	**CO4**
	c.	A multimode step index fiber with a core diameter of 80μm and a relative index difference of 1.5% is operating at a wavelength of 0.85μm. If the core refractive index is 1.48 estimate the normalized frequency for the fiber and number of guided modes.	**4**	**L3**	**CO4**
		OR			
Q.8	**a.**	Explain the linear and Non-linear scattering losses with suitable equations.	**8**	**L2**	**CO4**
	b.	Explain mode field diameter of single mode fiber.	**4**	**L2**	**CO4**
	c.	A 6 Km optical link consists of multimode step index fiber with a core RI of 1.5 and relative index different of 1% estimate : i) The delay difference between the slowest and fastest modes at the fiber output ii) RMS pulse broadening due to intermodal dispersion on the link iii) Maximum bit rate that may be obtained without substantiate errors on the link, only intermodal dispersion. iv) The bandwidth-length corresponding to (iii)	**8**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	What are the characteristic requirements of an optical source? With the help of diagram, describe the operation of surface emitting LED.	**8**	**L2**	**CO5**
	b.	Explain and derive the equations for quantum efficiency and LED power.	**8**	**L2**	**CO5**
	c.	Explain with the help of neat diagram Distributed – Feedback (DFB) laser diode.	**4**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain p-i-n photodide with a neat diagram.	**6**	**L2**	**CO5**
	b.	Describe the principle of working of isolators and circulators with neat diagram.	**8**	**L2**	**CO5**
	c.	Write a note on : i) Dielectric thin film filters ii) Diffraction Gratings.	**6**	**L2**	**CO5**

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