Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Broadband Communication Technology (ELEG 354) **Semester: V**
Programme: B. Tech EE -BCT
Time: 03 hrs. **Max. Marks: 100**
Instructions: **Attempt all questions.**
Diagrams must be neat and clean

SECTION A

S. No.		Marks	CO
Q 1	Compare the **two** widely used **communication media** and comment on the **better** of the two.	**5**	**CO2**
Q 2	Find out the maximum numbers of (i) Telephone signal (ii) Television signal (iii) FM audio signal, which can be linked by a full UHF frequency band.	**5**	**CO1**
Q 3	How an exchange connects a communication call between a caller party (mobile subscriber) and a calling party (mobile subscriber) over the same local subscriber loop.	**5**	**CO3**
Q 4	Why a DTH antenna mounted on the roof a house in Delhi is pointed towards South East direction.	**5**	**CO4**

SECTION B

Q 5	Define co-channel interference in cellular telephony. Determine the number of cells in a cluster and locate the first-tier co-channel cells for i=3 and j=2. (symbols have their usual meaning)	**10**	**CO3**
Q 6	Determine the numerical aperture, acceptance angle, critical angle and total numbers of mode supported by an optical fiber with the following parameters: Refractive index of core = 1.48 Refractive index of cladding = 1.45 Radius of core of optical fiber = 30 µm Radius of cladding of optical fiber = 80 µm Operating wavelength = 950 nm	**10**	**CO2**

Q 7	Classify the different satellites in terms of altitude. Write down two advantages and two disadvantages of each orbit under this classification.	**10**	**CO1**
Q 8	State Kepler's second law of orbital motion. A satellite is revolving round the earth at a height of 3600 km and the orbit is circular. Determine its speed in its orbit	**10**	**CO4**
	SECTION-C		
Q 9	Determine the optical power received in dBm and watts for a 10-km multi-mode step index optical fiber link with the following parameters: Refractive index of core = 1.48 Refractive index of cladding = 1.42 LED output power of 30 mW Three cable-to-cable connectors with a loss of 2 dB each Two cable-to- splice connectors with a loss of 1.5 dB each Light source-to-fiber interface loss of 2.8 dB Fiber-to-light detector loss of 1.2 dB No losses due to cable bends.	**20**	**CO3**
Q 10	A typical earth station has a transmitting power of 50 W and a transmission rate of 50 Mbps. The gain of the transmitting antenna is 12 dB. The distance between the earth station and the satellite is 2000 km, and the operating frequency is 5 GHz. Compute the following parameters. (i) Effective Isotropic Radiated Power, (ii) Energy of the bit (iii) Free space path loss	**20**	**CO4**

Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Broadband Communication Technology (ELEG 354) **Semester: V**
Programme: B. Tech EE -BCT
Time: 03 hrs. **Max. Marks: 100**
Instructions: **Attempt all questions.**
Diagrams must be neat and clean

SECTION A

S. No.		Marks	CO
Q 1	How an exchange connects a communication call between a caller party (wireline subscriber) and a calling party (mobile subscriber) over the local subscriber loop.	**5**	**CO3**
Q 2	Why a DTH antenna mounted on the roof a house in Sydney is pointed towards North East direction.	**5**	**CO4**
Q 3	Compare between the mode of communication by Optical fiber and Microwave radio and comment on the better of the two.	**5**	**CO1**
Q 4	Determine the number of (i) Telephone signal (ii) Television signal (iii) FM audio signal, which can be linked by a typical satellite transponder.	**5**	**CO2**
	SECTION B		
Q 5	State Kepler's third law of orbital motion. From this, compute the height of a satellite if it takes 12 hrs to complete one revolution around the earth.	**10**	**CO4**
Q 6	Determine the numerical aperture, acceptance angle and total numbers of mode supported by an optical fiber with the following parameters: Refractive index of core = 1.45 Refractive index of cladding = 1.41 Radius of core of optical fiber = 20 µm Radius of cladding of optical fiber = 100 µm Operating wavelength = 1300 nm	**10**	**CO2**
Q 7	Comment on the importance of the frequency re-use in cellular telephony. Draw a honeycomb cell pattern for i=1 and j=2 having 3 clusters. Find out the total number	**10**	**CO3**

	of cells there in the clusters?		
Q 8	Classify the different types of optical fiber with typical values of its main constituents. Draw the index profile and comment on usefulness of each.	**10**	**CO1**
	SECTION-C		
Q 9	A typical earth station has a transmitting power of 60 W and a transmission rate of 25 Mbps. The gain of the transmitting antenna is 15 dB. The distance between the earth station and the satellite is 15000 km, and the operating frequency is10 GHz. Compute the following parameters. (i) Effective Isotropic Radiated Power, (ii) Energy of the bit (iii) Free space path loss	**20**	**CO4**
Q 10	Determine the optical power received in dBm and watts for a 30-km multi-mode step index optical fiber link with the following parameters: Refractive index of core = 1.48 Refractive index of cladding = 1.42 LED output power of 20 mW Four cable-to-cable connectors with a loss of 2.5 dB each Two cable-to- splice connectors with a loss of 2 dB each Light source-to-fiber interface loss of 1.8 dB Fiber-to-light detector loss of 2 dB No losses due to cable bends.	**20**	**CO3**