

# BCS online mcq exam 2020

Attempt all questions

\* Required

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## KEPLER'S LAWS

1 point

- ☐ Orbit is an ellipse with the larger body (earth) at one focus
- ☐ The satellite sweeps out equal arcs (area) in equal time (NOTE: for an ellipse, this means that the orbital velocity varies around the orbit)
- ☐ The square of the period of revolution equals a CONSTANT  $\propto$  the THIRD POWER of SEMI-MAJOR AXIS of the ellipse
- ☒ all above

## Why WDM

2 points

- ☐ Capacity upgrade of existing fiber networks (without adding fibers)
- ☐ Transparency: Each optical channel can carry any transmission format (different asynchronous bit rates, analog or digital)
- ☒ Scalability– Buy and install equipment for additional demand as needed
- ☐ Wavelength routing and switching: Wavelength is used as another dimension to time and space



Roll No \*

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Student Name \*

Rohit Nimkar

A C-band earth station has an antenna with a transmit gain of 54 dB. The transmitter output power is set to 100 W at a frequency of 6.100 GHz. The signal is received by a satellite at a distance of 37,500 km by an antenna with a gain of 26 dB. The signal is then routed to a transponder with a noise temperature of 500 K, a bandwidth of 36 MHz, and a gain of 110 dB. Calculate the power at the output port (sometimes called the output waveguide flange) of the satellite antenna, in dBW. 4 points

- ☒ -99
- ☐ 99
- ☐ 100

It limits the information carrying capacity of a fiber.

1 point

- ☐ Signal Attenuation
- ☒ Signal distortion



A fiber has the following characteristics:  $n_1 = 1.35$  (core index) and  $\Delta = 2\%$ . Find the N.A and the acceptance angle 4 points

- ☒ 15.66
- ☐ 31.33
- ☐ 35
- ☐ 14

Basic FBG is an 1 point

- ☐ Fiber bragg grating
- ☒ in-fiber passive optical band reject filter
- ☐ in-fiber passive optical band pass filter

To cover entire earth which communication system is used 1 point

- ☒ Satellite
- ☐ Fiber optics
- ☐ Microwave
- ☐ cable

Why are VHF, UHF, and microwave signals used in satellite communication? 1 point

- ☐ a) More bandwidth
- ☐ b) More spectrum space
- ☒ c) Are not diffracted by the ionosphere
- ☐ d) Economically viable



The transmitter-receiver combination in the satellite is known as a \_\_\_\_\_ 1 point

- ☐ Relay
- ☐ b) Repeater
- ☒ c) Transponder
- ☐ d) Duplexer

satellite communication subsystems

1 point

- ☒ AOCS
- ☐ TTMC
- ☐ ANTENNA
- ☐ tracking system

optical detector

1 point

- ☒ PIN
- ☐ Avlanche
- ☐ optocoupler
- ☐ LDR

$P_t G_t$  is often called

1 point

- ☒ the effective isotropically radiated power
- ☐ the effective isotropic resistive power
- ☐ power gain product



Space Shuttle Circular orbit (height =  $h = 250$  km). Use earth radius = 6378 km a. Period = ? b. Linear velocity = ? 4 points

- ☒ T = 89 mins 30.13 secs and  $V = 7.755$  km/s.
- ☐ T = 89 mins and  $V = 7.755$  km/s.
- ☐ T = 89 mins 30.13 secs and  $V = 7$  km/s.
- ☐ T = 90 mins and  $V = 8$  km/s.

what is sub satellite point

1 point

- ☒ earth station
- ☐ required to calculate link budget
- ☐ sub part of satellite

Rain attenuation increases with the frequency, being worse for Ku-band than for C-band. 1 point

- ☐ False
- ☒ True



Calculate

6 points

***FIND* the Elevation and Azimuth**

Look Angles for the following case:

Earth Station Latitude	52° N	}	London, England Dockland region
Earth Station Longitude	0°		
Satellite Latitude	0°	}	Geostationary INTELSAT IOR Primary
Satellite Longitude	66° E		

- ☒ Elevation Angle = 5.85
- ☐ Azimuth Angle = 109.33
- ☐ Elevation Angle = 7.12
- ☐ Azimuth Angle = 100

Essential component of optical fiber communication

1 point

- ☐ Convert the received optical signal into electrical signal
- ☒ Convert the received optical signal into electrical signal then amplified before further processing
- ☐ Convert the received signal into electrical signal then amplified before further processing



The earth area covered by a satellite radio beam

1 point

- ☐ Beam width
- ☐ Band width
- ☒ . Footprint
- ☐ zone

Active Optical Components

1 point

- ☒ Tunable Optical Filter
- ☐ Tunable Source
- ☐ Wavelength splitters

ES to satellite is 42,000 km,  $f$  is 6 GHz, what is FSL?

4 points

- ☐ 150
- ☐ 200
- ☐ 100
- ☐ 250



Two layers of glass are placed on top of each other. The light is travelling from  $n = 1.45$  to  $n = 1.40$ . Find the range of angles  $\theta$ , for which total internal reflection takes place 4 points

- ☐ 15 degree
- ☐ all angles less than 15 degree
- ☐ 35 degree
- ☐ all angles less than 35 degree

The link budget consist of the following 1 point

- ☐ Up link budget
- ☐ Downlink Budget
- ☐ Uplink & Downlink Budget
- ☒ All gains and losses in link

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- ☒ 199 dB
- ☐ 190 dB
- ☐ 200 dB





find below

1 point

C band

4 Ghz

4 /6 GHz

☐☒

Noise power is given by,

1 point

☒  $P_n = kT_p B_n$

☐  $P_n = kT_{\text{Temp}} BW$

☐  $P = kT_p B_n$

☐  $P = kT_{\text{Temp}} BW$

determines the light accepting ability of a fiber

1 point

☒ Numerical Aperature

☐ Acceptance angle

☐ Critical angle

☐ modes

visibility test will quickly tell you whether you can operate a satellite into a given location

1 point

☐ False

☒ True



### Requirements of Detector

1 point

- ☐ Large electrical response to the received optical signal
- ☒ Short response time to obtain a suitable bandwidth
- ☐ A minimum noise introduced by a detector
- ☐ Stability of performance characteristics

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