Printed pages: 02   Sub Code: EEC-701

PaperID | 3 | 0 | 3 | 2 | Roll No. | | | | | | | | | | |

B.TECH
(SEM VII) THEORY EXAMINATION 2017-18
OPTICAL COMMUNICATION

Time: 3 Hours   *Total Marks: 100*

Note: 1.   Attempt all Sections. If require any missing data; then choose suitably.
2.   Any special paper specific instruction.

SECTION A

1.   Attempt *all* questions in brief.   2 x10 = 20

a. Write the four advantages of optical fibers.
b. Find out the numerical aperture of a single mode fiber where $n_1=1.4675$, $n_2= 1.4622$
c. Which type of dispersion does not exist in a single mode fiber and why ?
d. The light travels with in a cladding faster than it does with in a core. Why?
e. What are the major drawbacks of a homo structured LED?
f. Distinguish between coherent, incoherent and super radiant emission process.
g. Give two reasons why a pin photo diode is used more often than an APD.
h. What do you mean by receiver sensitivity?.
i. What is WDM?
j. Write the differences between LASER and LED.

SECTION B

2.   Attempt any *three* of the following: 10 x 3 = 30

a. Draw the block diagram of an optical communication system. With the suitable ray diagram, explain the propagation of skew rays in the optical wave guide and compare it with mendional ray.
b. With the help of neat diagram explain the following in case of optical fiber transmission
     (i) Scattering and bending losses
     (ii) Core and cladding losses
c. Discuss the construction, working principle and applications of a semiconductor injection laser.
d. Explain the construction and detection process in p-i-n photo diode.What factors must you take into account to choose the correct width of an intrinsic layer in a p-i-n photo diode.
e. With the help of analytical steps explain the different multi channel transmission techniques in an optical communication system.

SECTION C

3.   Attempt any *one* part of the following: 10 x 1 = 10

(a) Discuss the concept of acceptance angle in optical fiber with the help of proper diagram. For a multi mode step index fiber assume that it has following parameters
Core r.i=n_1=1.53, Cladding r.i = n_2= 1.48
Find out the angle of acceptance and critical angle when light is incident from air.

(b) Explain the different propagation modes in single mode fiber. For a SMF, if the beat length is 8 cm, the operating wavelength is 1300 nm. Find out the birefringence in SMF.

4. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Write the names of different dispersion techniques. With the help of neat diagram explain the intermodal dispersion .Derive an expression for the pulse spread.

(b) Explain why a tee coupler is more useful when used in a network with few terminals. Write the advantages of tee coupler over a star coupler.

5. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) Draw the electric circuit of LED and explain the function of each component. What are the differences between surface emitting LED and an edge emitting LED?

(b) What are the features of a LASER diode as light source? What is Bernard Duraffourg condition? Derive the condition.

6. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) With the help of neat sketches explain the equivalent circuit of a digital optical fiber receiver.

(b) Discuss the construction,operation and limitations of APD.

7. **Attempt any *one* part of the following:** **10 x 1 = 10**

(a) With the help of analytical steps explain the OTDR and optical power meter in detail.

(b) With the help of neat sketches explain the principle of WDM.