Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2022

EC3CO14 Fiber Optic Communications

Programme: B.Tech. Branch/Specialisation: EC

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Which among the following do/does not support/s the soot formation process? **1**

(a) OVPO (b) MCVD (c) PCVD (d) All of these

ii. The frequency of the absorbed or emitted radiation is related to difference in energy E between the higher energy state E_2 and the lower energy state E_1. State what 'h' stands for in the given equation? **1**

$E = E_2 - E_1 = hf$

(a) Gravitation constant (b) Planck's constant

(c) Permittivity (d) Attenuation constant

iii. In WDM system channel separation is **1**

(a) 100 GHz (b) 50 GHz (c) 150 GHz (d) 125 GHz

iv. _____ cannot be used for wideband amplification. **1**

(a) Semiconductor optical amplifier

(b) Erbium-doped fiber amplifier

(c) Raman fiber amplifier

(d) Brillouin fiber amplifier

v. Range of O- Band in nm is_____. **1**

(a) 1260 to 1360 (b) 1360 to 1460

(c) 1460 to 1530 (d) 1565 to 1625

vi. The amount of radiance in planer type of LED structures is- **1**

(a) Low (b) High (c) Zero (d) Negligible

P.T.O.

vii. The depletion region must be _____ to allow a large fraction of the incident light to be absorbed in the device (photodiode). **1**
(a) Thick (b) Thin (c) Long (d) Inactive

viii. Broadening of pulses in OFC occurs due to___. **1**
(a) Attenuation loss (b) Dispersion loss
(c) Scattering loss (d) Absorption loss

ix. The _____ is photosensitive to act as light gathering element. **1**
(a) Base-emitter junction
(b) Base-collector junction
(c) Collector-emitter junction
(d) Base-collector junction and Base-emitter junction

x. For total internal reflection in OFC Incident angel and Critical angel have condition ___. **1**
(a) Incident angel = Critical angel
(b) Incident angel = > Critical angel
(c) Incident angel <= Critical angel
(d) Not related

Q.2 i. What is the difference between single mode and multimode mode fibre? **2**
ii. What is PREFORM? Explain any one method of PREFORM fabrication in brief. **3**
iii. A MMGI fiber has a core with parabolic refractive index profile, with diameter of 60 micrometer the fibre has numerical aperture 0.2, estimate the total number of propagation mode at a wavelength of 1 um. **5**
OR iv. For a 30km long fibre attenuation 0.8 db/km at 1300 nm if a 200 uw power is launched into the fibre find output power. **5**

Q.3 i. Define single and double heterojuntion in LED. **4**
ii. Explain different types of LED in brief. **6**
OR iii. Explain LED characteristics, power and efficiency. **6**

Q.4 i. Discuss about optical detection principle. **3**
ii. What is APD? Write advantages and drawback of APD. **7**

OR iii. Explain optical amplifiers and semiconductor amplifiers. **7**

Q.5 i. What is scattering? Classify types of scattering. **3**
ii. Derive the expression for Acceptance angle, NA and critical angle. **7**
OR iii. What is dispersion? Derive the expression for material dispersion. **7**

Q.6 i. What is isolator and circulator. **4**
ii. Explain WDM architecture for fibre. **6**
OR iii. Briefly explain optical sensors and its application. **6**

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Marking Scheme
EC3CO14 Fiber Optic Communications

Q.1	i.	Which among the following do/does not support/s the soot formation process? (c) PCVD	**1**
	ii.	The frequency of the absorbed or emitted radiation is related to difference in energy E between the higher energy state E_2 and the lower energy state E_1. State what 'h' stands for in the given equation? $E = E_2 - E_1 = hf$ (b) Planck's constant	**1**
	iii.	In WDM system channel separation is (a) 100 GHz	**1**
	iv.	_____ cannot be used for wideband amplification. (d) Brillouin fiber amplifier	**1**
	v.	Range of O- Band in nm is_____. (a) 1260 to 1360	**1**
	vi.	The amount of radiance in planer type of LED structures is- (a) Low	**1**
	vii.	The depletion region must be _____ to allow a large fraction of the incident light to be absorbed in the device (photodiode). (a) Thick (b) Thin (c) Long (d) Inactive	**1**
	viii.	Broadening of pulses in OFC occurs due to___. (b) Dispersion loss	**1**
	ix.	The _____ is photosensitive to act as light gathering element. (b) Base-collector junction	**1**
	x.	For total internal reflection in OFC Incident angel and Critical angel have condition ___. (b) Incident angel = > Critical angel	**1**
Q.2	i.	Each difference (1 Mark*2)	**2**
	ii.	What is PREFORM 1 Mark Explain any one method of PREFORM 2 Mark	**3**
	iii.	Estimate the total number of propagation mode at a wavelength of 1 um. (As per explanation)	**5**
OR	iv.	For a 30km long fibre attenuation 0.8 db/km at 1300 nm if a 200 uw power is launched into the fibre find output power.. (As per explanation)	**5**
Q.3	i.	Define single and double (2 Marks*2)	**4**
	ii.	Explain different types of LED in brief. (2 Marks*3)	**6**
OR	iii.	LED characteristics, power and efficiency. (2 Marks*3)	**6**
Q.4	i.	Optical detection principle with diagram (As per explanation)	**3**
	ii.	What is APD with diagram 3 Marks Write advantages 2 Marks Drawback of APD. 2 Marks	**7**
OR	iii.	Explain optical amplifiers with diagram 4 Marks Semiconductor amplifiers. 3 Marks	**7**
Q.5	i.	What is scattering with diagram 1 Mark Classify types of scattering. 2 Marks	**3**
	ii.	Acceptance angle,with diagram 3 Marks NA 2 Marks critical angle. 2 Marks	**7**
OR	iii.	What is dispersion with diagram 2 Marks Derive the expression for material dispersion. 5 Marks	**7**
Q.6	i.	What is isolator with diagram 2 Marks circulator. 2 Marks	**4**
	ii.	Explain WDM architecture for fibre. with diagram (As per explanation)	**6**
OR	iii.	Briefly explain optical sensors 3 Marks its application. 3 Marks	**6**

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