******SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**RAMAPURAM CAMPUS**

**FACULTY OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**CONTINUOUS LEARNING ASSESMENT – III**

**Sub Code/Name : 18ECO107T FIBEROPTICS & OPTOELECTRONICS Set: B**

**Class/Sem/Course : III Yr / VI Sem / B. Tech -CSE (ALL DISCIPLINE) & IT Date: 06/05/2023 AN**

**Max Marks : 50 Duration: 90 mins**

**PART-A (10x1= 10)**

**ANSWER ALL THE QUESTIONS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.No.** | **Question** | **Marks** | **CO** | **BL** | **PI** |
| 1 | Induced birefringence is called.  (a) magneto optic effect (b)electro optic effect  (c) acousto optic effect (d)thermal optic effect | 1 | 4 | 1 | 1.2.1 |
| 2 | Pockel effect occurs when …………………………?  (a) electric field is zero  (b)quadratic electro optic coefficient is smaller than linear electro optic coefficient.  (c) quadratic electro optic coefficient is larger than linear electro optic coefficient.  (d)magnetic field is zero. | 1 | 4 | 1 | 1.3.1 |
| 3 | The change in refractive index of a medium due to the presence of sound waves is called  (a) acousto optic effect (b) coulomb blockade effect  (c) photo emissive effect (d) electro optic effect | 1 | 4 | 1 | 2.1.2 |
| 4 | In a longitudinal electro-optic modulator, half-wave voltage is that voltage which introduces the following phase shift between two polarization components:  (a) /4 (b) /2 (c) (d) | 1 | 4 | 2 | 1.3.1 |
| 5 | In a transverse electro-optic modulator\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (a) Vp is independent of the length l and width d of the modulator crystal.  (b) Vp is dependent on the length l but not on the width d of the crystal.  (c) Vp is dependent on the width d but not on the length l of the crystal.  (d) Vp is dependent on the ratio d/l | 1 | 4 | 2 | 1.3.1 |
| 6 | Monolithic integration for optical sources are confined to the use of  \_\_\_\_\_\_\_\_\_\_ semiconductors.  a) Ⅲ-Ⅴ b) Ⅱ-Ⅲ c) Ⅰ-Ⅱ d) Ⅶ-Ⅷ | 1 | 5 | 1 | 1.2.1 |
| 7 | The OEICs realization \_\_\_\_\_\_\_\_\_\_ as compared to the other  developments in IO.  a) Scripted b) Decreased c) Lagged behind d) Increased | 1 | 5 | 1 | 2.1.2 |
| 8 | HEMT based \_\_\_\_\_\_\_\_\_\_ have a spot-size convertor with a photodiode.  a) p-n junction diode b) p-i-n photoreceiver  c) IGBT d) BJT | 1 | 5 | 1 | 1.3.1 |
| 9 | Hybrid \_\_\_\_\_\_\_\_ integration demands \_\_\_\_\_\_\_\_\_ IP circuits to be produced on a single substrate.  a) IP, single-layered b) IO, multi-layered  c) IP, multi-layered d) IO, multi-layered | 1 | 5 | 1 | 1.3.1 |
| 10 | A four-port multimode fiber FBT coupler has 50 μW optical power launched into port 1. The measured output power at ports 2,3 and 4 are 0.003, 23.0 and 24.5 μW respectively. Determine the excess loss.  a) 0.22 dB b) 0.33 dB c) 0.45 dB d) 0.12 dB | 1 | 5 | 3 | 1.2.1 |

**PART B (4x4= 16)**

**ANSWER ANY 4 QUESTIONS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.No.** | **Question** | **Marks** | **CO** | **BL** | **PI** |
| 11 | How longitudinal electro optic modulator differs from transverse electro optic modulator? | 4 | 4 | 2 | 1.2.1 |
| 12 | Write a short note about Raman Nath Modulator. | 4 | 4 | 1 | 1.2.1 |
| 13 | Derive the expression for optical amplifier gain. | 4 | 4 | 2 | 2.1.3 |
| 14 | What are the challenges met by optoelectronic integrated circuit? | 4 | 5 | 1 | 1.2.1 |
| 15 | Distinguish between Monolithic and Hybrid Integration | 4 | 5 | 1 | 2.1.2 |
| 16 | What do you mean by front end Photo receivers? | 4 | 5 | 1 | 1.2.1 |

**PART C (2x12= 24)**

**ANSWER THE QUESTIONS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.No** | **Question** | **Marks** | **CO** | **BL** | **PI** |
| 17. a | Explain with a neat diagram, the construction and working of electro optic effect based longitudinal electro optic modulator.  OR)  Discuss the basic configuration, working principle and gain of Semiconductor optical amplifier (SOA). | 12 | 4 | 3 | 2.1.3 |
| 17. b | 12 | 4 | 2 | 2.1.3 |
| 18. a | Elaborate on the working of Mach Zehnder Interferometers and comment on the applications.  (OR)  Discuss the materials and processing techniques of OEIC. | 12 | 5 | 2 | 2.1.3 |
| 18. b | 12 | 5 | 3 | 2.1.2 |

**Outcome Alignment Matrix:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QUESTION**  **NUMBER** | **CO distribution** | | | | |
| **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| 1 |  |  |  | 1 |  |
| 2 |  |  |  | 1 |  |
| 3 |  |  |  | 1 |  |
| 4 |  |  |  | 1 |  |
| 5 |  |  |  | 1 |  |
| 6 |  |  |  |  | 1 |
| 7 |  |  |  |  | 1 |
| 8 |  |  |  |  | 1 |
| 9 |  |  |  |  | 1 |
| 10 |  |  |  |  | 1 |
| 11 |  |  |  | 4 |  |
| 12 |  |  |  | 4 |  |
| 13 |  |  |  | 4 |  |
| 14 |  |  |  |  | 4 |
| 15 |  |  |  |  | 4 |
| 16 |  |  |  |  | 4 |
| 17a |  |  |  | 12 |  |
| 17b |  |  |  | 12 |  |
| 18a |  |  |  |  | 12 |
| 18b |  |  |  |  | 12 |
| **Total** |  |  |  | **41** | **41** |
| **%** |  |  |  | **50%** | **50%** |

**Quality Matrix**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Question No.** | **BL Distribution** | | |
| **L1** | **L2** | **L3** |
| 1 | 1 |  |  |
| 2 | 1 |  |  |
| 3 | 1 |  |  |
| 4 |  | 1 |  |
| 5 |  | 1 |  |
| 6 | 1 |  |  |
| 7 | 1 |  |  |
| 8 | 1 |  |  |
| 9 | 1 |  |  |
| 10 |  |  | 1 |
| 11 |  | 4 |  |
| 12 | 4 |  |  |
| 13 |  | 4 |  |
| 14 | 4 |  |  |
| 15 | 4 |  |  |
| 16 | 4 |  |  |
| 17a |  |  | 12 |
| 17b |  | 12 |  |
| 18a |  | 12 |  |
| 18b |  |  | 12 |
| **Total** | **23** | **34** | **25** |
| **%** | **27%** | **41%** | **32%** |

**Bloom’s level Distribution:**

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Associate Professor/ECE Scrutinised by: Mrs V. Reji

Verified and approved by HOD