Bachelor of Science (T.Y. B.Sc.) Sixth Semester B.Sc. 4537 - PHYSICS : Paper-II (Fibre Optics, Communication and Digital Electronics)

P. Pages: 2

Time : Three Hours

* 1 0 7 2 *

GUG/W/18/1359

Max. Marks : 50

| | | Eitł | ner | |
|----|----|------------|--|------|
| 1. | a) | i) | Discuss basic structure of optical fibre. | 2 |
| | | ii) | Derive an expression Numerical aperture. | 4 |
| | | iii) | Compute the N. A., acceptance angle and critical angle of the fibre having $r_1 \leftarrow \mu_1 = 1.50$ and $\mu_2 = 1.45$. | 3 |
| | | iv) | What are advantages of optical fibre? | 1 |
| | | | OR | _ |
| | b) | i) | What is modulation? Why it is necessary? | 3 |
| | | ii) | Define frequency modulation. Derive an expression for FM wave. | 5 |
| | | iii) | A carrier of frequency 50MHz is frequency modulated by a signal of frequency f_m of 5kHz. The frequency deviation f_d is of 50kHz. Calculate modulation index. | 2 |
| | | Either | | |
| 2. | a) | i) | Explain binary coded decimal. | 2 |
| | | ii) | Describe the construction and working of full adder using half adders. | 5 |
| | | iii) | Perform following subtraction using 2's complement method $(111001)_2 - (101010)_2$. OR | 3 |
| | b) | i) | What is flipflop? Construct D flipflop and explain its working. | 4 |
| | | ii) | Draw the logic diagram of JKMS flipflop and explain its working. | 4 |
| | | iii) | What is race around condition? how it can be eliminated? | 2 |
| | | Eitł | ner | |
| 3. | a) | Exp | plain stepped index fibre. | 21/2 |
| | b) | Pro | ve that $P_{\rm T} = P_{\rm C} \left[1 + \frac{{\rm m}^2}{2} \right]$ | 21/2 |
| | c) | Cor | nstruct basic gate by using NOR gate. | 21/2 |
| | d) | Wh | at is ring counter? How it differ from a normal counter? OR | 21/2 |
| | e) | Wh fibe | at are the advantages and disadvantages of the monomode and multimode optical or? | 21/2 |
| | f) | Exp | plain significant side band terms in frequency modulation. | 21/2 |

| | g) | $(11011011011)_2 = (?)_{16} = (?)_{10}$ | | |
|------|-------------------------------------|---|------------------------------------|--|
| | h) | Draw circuit diagram of Astable multivibrator & Explain its working. | | |
| 4. | a) | Either Describe the mechanism for transmission of light with in optical fibre. | 2 ¹ / ₂ | |
| | b) | A broad cast radio transmitter radiates 10kW when the modulation percentage is 60. How much of this is carrier power? | | |
| | c) | What is logic gate? Draw symbol of two input AND, NAND, NOR & EX-OR. | | |
| | d) | Draw circuit diagram of 4 bit ripple counter & Explain its working. | | |
| | e) Explain losses in optical fibre. | | 21/2 | |
| f) D | | Discuss frequency spectrum in FM. | 2¹/ ₂ | |
| | g) | State & prove De Morgan's first theorem. | 21/2 | |
| | h) | Draw circuit diagram of 4 bit SISO shift register and explain it working. | 21/2 | |
| 5. | | Solve any ten from followings. | | |
| | | a) Define the term electrical band width. | 1 | |
| | | b) What is attenuation in optical fibre? | 1 | |
| | | c) What is physical significance of bandwidth length product? | 1 | |
| | | d) Define modulation index. | 1 | |
| | | e) Define frequency deviation. | 1 | |
| | | f) What are disadvantages of FM? | 1 | |
| | | g) What do you meant by 10's complement of a number? | 1 | |
| | | h) What is Ex-NOR gate? | 1 | |
| | | i) Write truth task for full subtractor. | 1 | |
| | | j) Draw symbol of JK flipflop. | 1 | |
| | | k) What are type of register? | 1 | |
| | | 1) What is modulus of counter? | 1 | |
