POLITEKNIK
Jabatan Pengajian Politeknik

EXAMINATION AND EVALUATION DIVISION
DEPARTMENT OF POLYTECHNIC EDUCATION
(MINISTRY OF HIGHER EDUCATION)

ELECTRICAL ENGINEERING DEPARTMENT

FINAL EXAMINATION

JUNE 2012 SESSION

EP 501 : FIBER OPTIC COMMUNICATION SYSTEM

DATE : 23rd NOVEMBER 2012 (FRIDAY)

DURATION : 2 HOURS (8.30AM – 10.30AM)

This paper consists of **SEVEN (7)** pages including the front page.
Section A: Structure(10 question – answer all)
Section B: Essay (3 questions – answer all)

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(The CLO stated is for reference only)

SECTION A

STRUCTURE (40 marks)

INSTRUCTION:

This section consists of **TEN (10)** structured questions.

Answer **ALL** questions.

QUESTION 1

Explain the function of transmitter and receiver in fiber optic communication system [CLO1:C2]

(4 marks)

QUESTION 2

State **FOUR (4)** fiber optic technology applications [CLO1:C1]

(4 marks)

QUESTION 3

Briefly explain about refraction. [CLO1: C2]

(4 marks)

QUESTION 4

Sketch a Total Internal Reflection (TIR) in light propagation.[CLO1: C3]

(4 marks)

QUESTION 5

State **FOUR (4)** types of connector in fiber optic system. [CLO1 : C1]

(4 marks)

QUESTION 6

Explain the Material Scattering Losses. [CLO1:C2]   (4 marks)
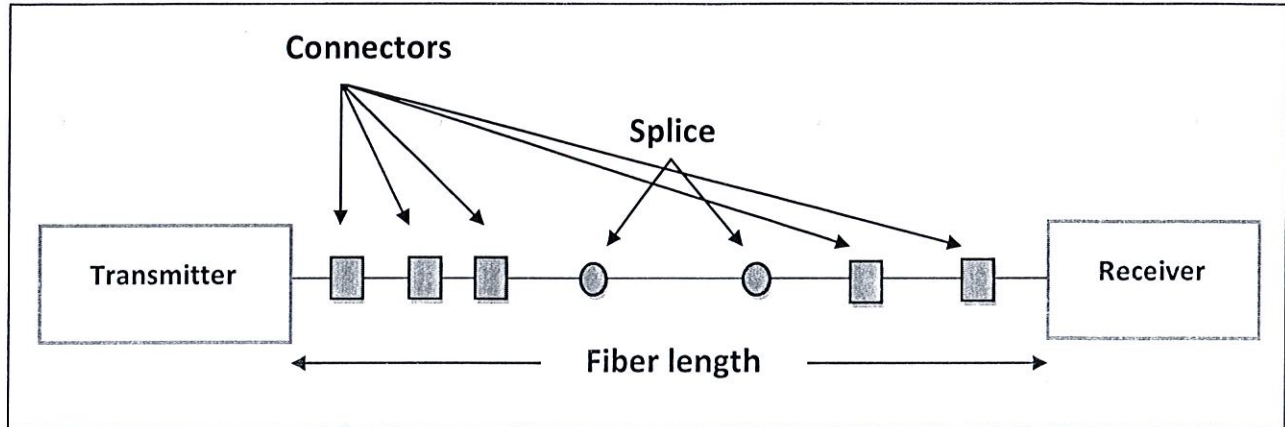
QUESTION 7

Figure Q7(a)

Figure Q7 (a) above shows a typical cable plant with 6 km single mode link with 5 connectors and 2 splices in the middle. Operating wavelength is 1300nm with fiber attenuation is 0.4dB/km, connector loss is 0.30 dB and splice loss is 0.35dB. Calculate the total fiber loss at the operating wavelength, connector loss, splice loss and total cable plant loss. [CLO1:C3]

(4 marks)

QUESTION 8

Give **TWO (2)** factors to be considered in link power budget. [CLO 1 : C2]

(4 marks)

QUESTION 9

Explain optical power.[CLO1 : C2]

(4 marks)

QUESTION 10

(a)   Name **TWO (2)** standards organisations involved in formulating testing standard in fiber optic measurement. [CLO1 : C1]

(2 marks)

(b)   State **TW0 (2)** functions for the standards organisations in 2(a) above.

[CLO1 : C1]

(2 marks)

SECTION B

ESSAY (60 marks)

Instruction: This section consists of **THREE (3)** essay questions. Answer all questions.

QUESTION 1

(a)   Define the terms below:

     i.   Acceptable angle
    ii.   Numerical Aperture (NA)
   iii.   Critical Angle

[CL01:C1]

(6 marks)

(b)   State light propagation in Fiber Optic based on Snell's Law.

[CL0 1:C1]

(3 marks)

(c)   With the aid of a diagram, describe the construction of the fiber optic cable.

[CL0 1:C1]

(7 marks)

(d)   List **TWO (2)** differences between single mode step index   fiber and multimode graded index fiber.
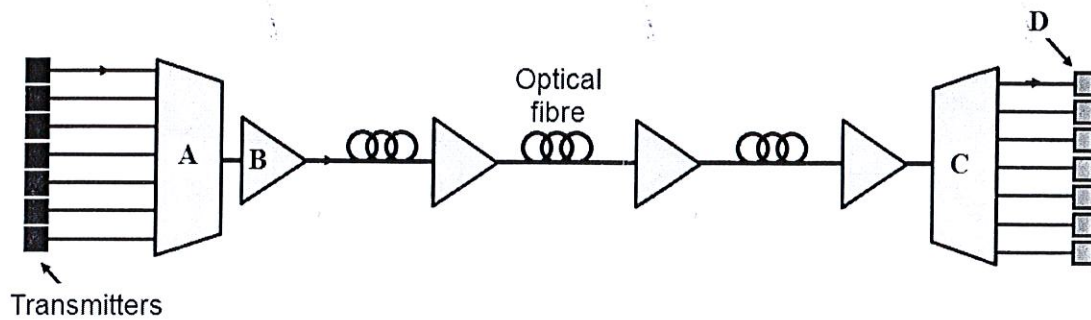
[CL0 1:C1]

(4 marks)

QUESTION 2

Figure Q2

(a)   **Figure Q2** is a block diagram of an optical networking
        system.

      i)   Name this system.   [CLO1 : C1]

                                                            (1 mark)

      ii)   Refer to **Figure 2**, label block A, B, C and D.   [CLO1 : C1]

                                                            (4 marks)

      iii)   Explain briefly the function of Block A, B, C and D.   [CLO1 : C2]

                                                            (8 marks)

      iv)   State **TWO (2)** advantages and **TWO (2)** disadvantages of this system.

                                                                  [CLO1: C1]

                                                                  (4 marks)

(b)   State the function of add/drop multiplexer/demultiplexer in an optical network
        system.   [CLO1: C1]

                                                                    (3 marks)

QUESTION 3

(a)   Define insertion losses.[CLO1 : C1]

(2 marks)

(b)   Define basic classes of standard in fiber optic measurement   [CLO 1 : C1]
       and test:

   i.   Primary Standards   (3 marks)

   ii.   Component and testing standards   (3 marks)

   iii.   System standards   (3 marks)

(c)   Describe the following fiber optic test :   [CLO 1 : C1]

   i.   Continuity testing   (3 marks)

   ii.   Insertion loss testing   (3 marks)

   iii.   Optical time domain reflectometer (OTDR) testing   (3 marks)