POLITEKNIK
MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI JUN 2016

DEP6323: WIRELESS COMMUNICATIONS

TARIKH : 01 NOVEMBER 2016
MASA : 2.30 PM - 4.30 PM (2 JAM)

Kertas ini mengandungi **LAPAN (8)** halaman bercetak.
Bahagian A: Struktur (4 soalan)
Bahagian B: Esei (2 soalan)
Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SECTION A: 60 MARKS

BAHAGIAN A: 60 MARKAH

INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

Wireless network is a network which data signals flow through the air. It's useful for people to communicate and access applications and information without wires.

Rangkaian tanpa wayar adalah satu rangkaian yang membawa isyarat data melalui udara. Ianya sangat berguna bagi membolehkan manusia berkomunikasi, mencapai aplikasi dan maklumat tanpa menggunakan wayar.

CLO1
C1

a) State **THREE (3)** wireless communication categories.

   *Nyatakan **TIGA (3)** kategori komunikasi tanpa wayar.*

   [3 marks]

   [*3 markah*]

CLO1
C2

b) Describe the characteristics of a Wireless Personal Area Network (WPAN) in terms of coverage, applications and mobility.

   Jelaskan ciri-ciri Wireless Personal Area Network (WPAN) dari segi liputan, aplikasi dan mudah alih.

   [6 marks]

   [*6 markah*]

CLO1
C2

c) Generation of mobile phone standards such as 2nd Generation and 3rd Genertaion is set by the International Telecommunications Union (ITU). Differentiate the characteristics between these 2G and 3G technology.

Generasi piawaian telefon mudah alih seperti Generasi ke-Dua dan Generasi ke-Tiga ditetapkan oleh Kesatuan Telekomunikasi Antarabangsa (ITU). Bezakan ciri-ciri di antara teknologi 2G dan 3G ini.

[6 marks]

[*6 markah*]

QUESTION 2
SOALAN 2

CLO1
C2

a) There are many types of multiple access technique in wireless communication such as Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA). Identify **THREE (3)** objectives of multiple access.

Terdapat pelbagai jenis teknik capaian dalam sistem komunikasi tanpa wayar seperti Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA) dan Code Division Multiple Access (CDMA). Kenalpasti TIGA (3) objektif bagi akses pelbagai.

[3 marks]

[*3 markah*]

CLO1
C3

b) Interpret the implementation of Time Division Multiple Access / Frequency Division Duplex (TDMA/FDD) in GSM 900.

Tafsirkan dengan jelas penggunaan Time Division Multiple Access / Frequency Division Duplexing (TDMA / FDD) dalam GSM 900.

[6 marks]

[*6 markah*]

CLO1
C3

c) Generalize the main principle of Orthogonal Frequency Division Multiplexing (OFDM) modulation and choose **TWO (2)** examples of system which employs OFDM modulation.

Nyatakan secara umum prinsip utama modulasi Orthogonal Frequency Division Multiplexing (OFDM) dan pilih DUA (2) contoh sistem yang menggunakan teknik modulasi OFDM.

[6 marks]

[*6 markah*]

QUESTION 3
SOALAN 3

CLO1
C2

a) Global System for Mobile Communication (GSM) system contains Network and Switching Subsystem (NSS) as one of the main elements in the architecture. Explain the Mobile Switching Centre (MSC) and Gateway MSC (GMSC) in NSS.

Global System for Mobile Communication (GSM) *mengandungi* Network and Switching Subsystem (NSS) *sebagai salah satu binaan asas sistem.* *Terangkan* Mobile Switching Centre (MSC) *dan* Gateway MSC (GMSC) *dalam* NSS.

[3 marks]

[*3 markah*]

CLO1
C3

b) Demonstrate Global System for Mobile Communication (GSM) call set procedure for an outgoing call.

Tunjukkan prosedur bagi membuat panggilan keluar menggunakan Global System for Mobile Communication *(GSM).*

[6 marks]

[*6 markah*]

CLO1
C3

c) To implement General Packet Radio system (GPRS), new nodes in GSM was developed. List the new nodes and draw the block diagram network for GPRS architecture.

Untuk melaksanakan General Packet Radio system (GPRS)*, nod - nod baru dalam GSM dibangunkan. Senaraikan nod baru tersebut dan lukiskan gambarajah blok seni bina rangkaian* GPRS.

[6 marks]

[*6 markah*]

QUESTION 4

CLO1
C1

a) Bluetooth initiated on 1989 by Dr. Nil Rydbeck and Dr. Johan Ullman to develop short link radio technology. Define Bluetooth.

Bluetooth *muncul pada tahun 1989 melalui Dr. Nil Rydbeck dan Dr. Johan Ullman yang membangunkan teknologi radio saluran pendek. Takrifkan* Bluetooth.

[3 marks]

[*3 markah*]

CLO1
C2

b) Bluetooth have two types of network topology and one of them known as piconet. Describe the piconet topology.

Bluetooth *mempunyai dua jenis topologi rangkaian dan salah satu daripadanya dikenali sebagai* piconet*. Terangkan topologi* piconet.

[5 marks]

[*5 markah*]

CLO1
C3

c) Interpret Frequency-Hopping Spread Spectrum (FHSS) as radio Bluetooth technology.

Terjemahkan Frequency-Hopping Spread Spectrum (FHSS) *sebagai teknologi radio* Bluetooth.

[7 marks]

[*7 markah*]

SECTION B: 40 MARKS
BAHAGIAN B: 40 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** essay questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **DUA (2)** soalan esei. Jawab **SEMUA** soalan.*

QUESTION 1
SOALAN 1

CLO2
C3

When the transmitting and receiving antennas are placed over a large distance and the received signal is in the Line of Sight path unobstructed, then the propagation model is the free space model. Consider a ground station antenna of gain 25dBi transmits signal at 52dBm. A satellite located at a distance of 41935km from the earth receives the signal. The gain of the receiver antenna satellite is 15dBi with frequency of transmission is 1GHz and assume there is no system loss (L=1). Using Friis Free space equation in log domain, calculate the received power in dBm at the satellite receiver.

Apabila antena penghantar dan penerima diletakkan pada satu jarak yang jauh dan isyarat penerima berada di laluan Garis Nampak tanpa gangguan, model perambatan itu adalah model ruang bebas. Andaikan antena stesen bumi mempunyai gandaan 25dBi menghantar isyarat pada 52dBm. Sebuah satelit menerima isyarat terletak pada jarak 41935km dari bumi. Gandaan antena penerima adalah 15dBi dengan frekuensi penghantaran adalah 1GHz, dan anggapkan sistem tanpa kehilangan (L = 1). Dengan menggunakan persamaan Friis Free space untuk mengira kuasa yang diterima dalam dBm di satelit penerima.

[20 marks]

[*20 markah*]

QUESTION 2
SOALAN 2

CLO1
C3

Bluetooth is a wireless standard technology for exchanging data over short distances using short-wavelength Ultra High Frequency (UHF) radio waves from fixed and mobile devices and building the Personal Area Network (PAN). Interpret a function of each **FIVE (5)** layers in Bluetooth Protocol Stack.

*Bluetooth adalah teknologi piawaian tanpa wayar untuk pertukaran data jarak pendek menggunakan panjang gelombang radio Ultra High Frequency (UHF) daripada peralatan tetap dan mudah alih seterusnya membentuk Rangkaian Kawasan Peribadi (PAN). Terjemahkan fungsi setiap **LIMA (5)** lapisan Bluetooth Protocol Stack.*

[20 marks]

[*20 markah*]

SOALAN TAMAT