UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016

COURSE NAME	:	DIGITAL AUDIO AND VIDEO BROADCASTING
COURSE CODE	:	BEB41903
PROGRAMME	:	BACHELOR OF ELECTRONIC ENGINEERING WITH HONOURS
EXAMINATION DATE	:	DECEMBER 2015 / JANUARY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FOUR (4)** QUESTIONS **ONLY**

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 (a) The Y signal is obtained from the combination of red (R), green (G), and blue (B). Please state the equation for Y.

(6 marks)

(b) Show the reason that the values of the terms R, G, and B is not the same in the equation Y that you state in **Q1 (a)**.

(6 marks)

(c) Compare between the YIQ and YUV signals.

(6 marks)

(d) Point out TWO (2) reasons why the YIQ (and YUV) signaling system is a preferred system during the transition from monochrome television to chromatic television.

(7 marks)

Q2 (a) State the phenomena and the conditions when an analogue signal which is being converted to a digital signal is under-sampled.

(5 marks)

(b) Between these three colour resolutions 4:4:4, 4:2:2, and, 4:1:1, explain which one has the best data compression.

(5 marks)

(c) Predict if the High-Definition Television (HDTV) can be broadcasted over the same medium as the Standard-Definition Television (SDTV) and vice versa.

(5 marks)

(d) Design the work flow for the compression methods found in MPEG2.

(10 marks)

Q3 (a) Show the reason that the Digital Video Broadcasting for satellite (DVB-S) modulator uses QPSK instead of AM modulation.

(6 marks)

(b) The success of digital signaling depends on the error corrections but there is no error correction in analogue signals. Express why error correction in analogue signal is impossible.

(6 marks)

(c) Differentiate between Quadrature phase-shift keying (QPSK) and 8-phase-shift keying (8PSK) in terms of symbol rate, data rate, and their respective constellation diagrams.

(6 marks)

(d) A raw MPEG2 video at a data rate of 280 Mbit/s will be broadcasted at a code rate of 3/4. Investigate what happens when the medium of broadcast was capped at a data rate of 200 Mbit/s.

(7 marks)

Q4 (a) Sketch and label TWO (2) types of broadcast media for Digital Video Broadcasting for Cable (DVB-C). For these media name ONE (1) advantage in terms of electrical noise.

(6 marks)

(b) In good DVB-C transmission cables as you state in **Q4 (a)**, the carrier-to-noise ratio C/N is very high. Explain why for both cables.

(3 marks)

(c) The 256 Quadrature amplitude modulation (QAM) has the highest symbol rate and data rate in the family of QAM and is highly prone to signal degradation if not broadcasted carefully. State the condition where this modulation can be applied successfully.

(6 marks)

(d) The nature of interference affecting DVB-C can be observed by looking at the constellation diagrams. Based on **Figure Q4**, investigate each noise affecting the signal in DVB-C.
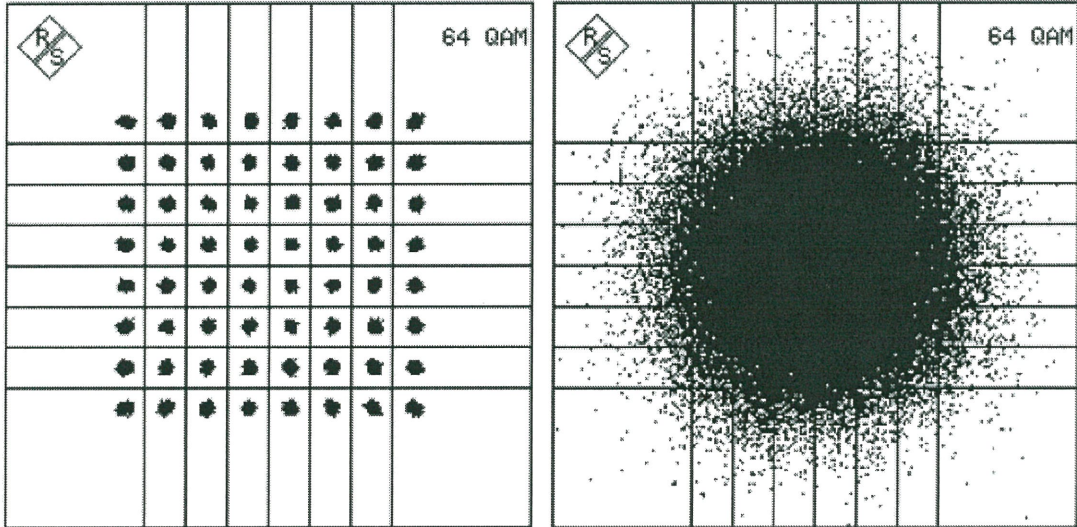
(10 marks)

Q5 (a) The selection of appropriate modulation technique in Digital Video Broadcasting for Terrestrial (DVB-T) is mainly determined by multipath reception which leads to location and frequency-selective fading. Explain frequency-selective fading.

(5 marks)

(b) In DVB-T, according to the Digital Video Broadcasting standard, it was decided that the most appropriate modulation method to cope with this problem would be Coded Orthogonal Frequency Division Multiplexing (COFDM). Compare the benefits of COFDM with that of standalone 64 Quadrature amplitude modulation (QAM) as in Digital Video Broadcasting for Cable (DVB-C).

(8 marks)

(c) Demonstrate how a hierarchical modulation plays an important role to ensure that reliable reception is still guaranteed even in poor conditions, e.g. a signal/noise ratio which is too bad.

(6 marks)

(d) Predict the interferences on the DVB-T transmission link and its effects.
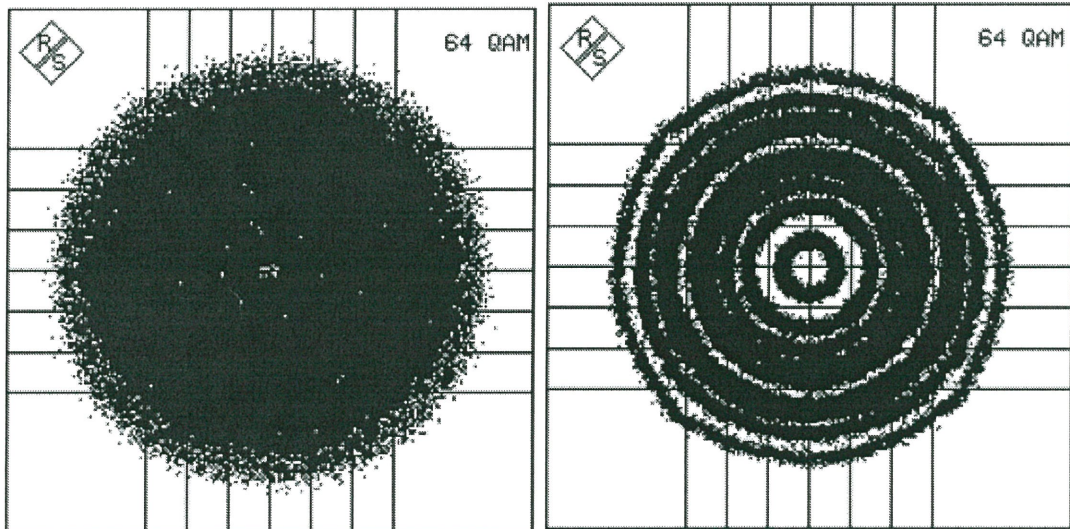
(6 marks)

- **END OF QUESTION -**

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(a)

(b)

(c)

(d)

FIGURE Q4