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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2014/2015**

COURSE NAME : STATISTICS
COURSE CODE : BIT 11603
PROGRAMME : 1 BIT
EXAMINATION DATE : JUNE 2015 / JULY 2015
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1 (a) The reliability of a system is the probability that a system is consistently performs according to its specifications. The reliability of a series system consisting of n independent components is given by

$$R_s = \prod_{i=1}^n R_i,$$

and the reliability of a parallel system consisting of n independent components is given by

$$R_p = 1 - \prod_{i=1}^n (1 - R_i)$$

where R_i is the reliability of the i^{th} component and

$$\prod_{i=1}^n x_i = x_1 * x_2 * \dots * x_n .$$

Consider a system consists of series and parallel CPUs (A,B,.....,H) with reliability as shown in Figure Q1(a).

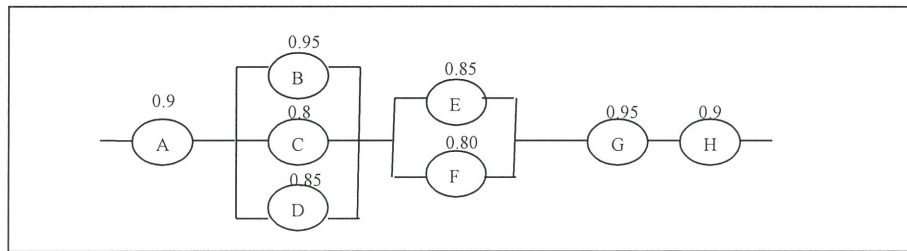


FIGURE Q1(a)

Find the reliability of the system.

(10 marks)

- (b) Let X be a continuous random variable with the function below,

$$f(x) = \begin{cases} 20(x^3 - x^4), & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

- (i) Show that $f(x)$ satisfy with the probability density function.

(5 marks)

- (ii) Find the mean and variance of X.

(5 marks)

- Q2** (a) A system consists of five databases that to be accessed by user's transaction. A transaction can successfully update databases when the transaction obtain majority locked from those databases. Assume that the probability of obtaining lock from each database is, $p = 0.9$. Find the probability of a transaction that can successfully update databases from the system.
(10 marks)
- (b) A server on average has to do five read-locks per hour. For any given hour, find the probability that it will do the following:
- (i) At most four read-locks
(5 marks)
- (ii) At least six read-locks
(5 marks)
- Q3** (a) Explain Central Limit Theorem applied in sampling distribution.
(6 marks)
- (b) Intelligent Quotients (IQ) in the general population are normally distributed with a mean of 100 and standard deviation of 15. A random sample of 40 students was taken in a certain university. Find the probability that the mean IQ of the sample is less than 109.
(6 marks)
- (c) From a random sample of 50 graduating students at a private college, the mean CGPA is 2.95 with standard deviation 3.25.
- (i) Calculate the point estimate of the CGPA
(2 marks)
- (ii) Construct a 90% confidence interval for the mean CGPA for all graduating students at this college.
(6 marks)

Q4 (a) State Type I and Type II errors in hypothesis testing. (3 marks)

(b) A car manufacturer claimed that the average gas mileage of its new brand of hybrid car is 25 miles per liter. The gas mileages for ten randomly selected hybrid cars of the new brand are recorded as:

24.4, 25.1, 22.6, 26.2, 25.3, 23.2, 21.9, 23.8, 24.5, 25.0

Assume that the gas mileage is normally distributed. Analyze whether the sample data support the manufacturer’s claim at the 0.01 significant level. (8 marks)

(c) Airport Limos offers limousine service from KLCC to KLIA airport. Mr. Ramli, as an operational manager, is considering two alternative routes; PLUS highway and ELITE highway. He had conducted a study on both alternative routes and produced the result shown in Table 1.

Table 1: Result of both routes

Route	PLUS Highway	ELITE Highway
Sample means(minutes)	56.0	59.0
Sample standard deviation (minutes)	12	4.96
Sample size	7	8

Analyze if there is any difference in the variation of the two alternative routes. [Use a 0.10 level of significance] (8 marks)

Q5 A research was carried out to study the relationship between inflation rate and unemployment rate. The data are summarized as in **Table 2**.

Table 2: The data between inflation rate and unemployment rate

Inflation Rate	Unemployment Rate
0.7	4.5
1.5	9.0
2.4	9.5
2.8	10.5
3.5	6.5
3.5	6.8
4.5	4.0
6.5	5.5

- (a) State the dependent and independent variables. (2 marks)

- (b) Determine and interpret the Pearson correlation coefficient between inflation rate and unemployment rate. (8 marks)

- (c) Construct a least squares regression equation of the two variables. (6 marks)

- (d) Predict the inflation rate for an unemployment rate of 7.0 (4 marks)

-END OF QUESTION-

