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**UNIVERSITI TEKNOLOGI MARA  
FINAL EXAMINATION**

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<b>COURSE</b>	<b>:</b>	<b>INTRODUCTION TO PROBABILITY AND STATISTICS</b>
<b>COURSE CODE</b>	<b>:</b>	<b>STA116</b>
<b>EXAMINATION</b>	<b>:</b>	<b>OCTOBER 2016</b>
<b>TIME</b>	<b>:</b>	<b>3 HOURS</b>

**INSTRUCTIONS TO CANDIDATES**

1. This question paper consists of ten (10) questions.
2. Answer ALL questions in the Answer Booklet. Start each answer on a new page.
3. Do not bring any material into the examination room unless permission is given by the invigilator.
4. Please check to make sure that this examination pack consists of :
  - i) the Question Paper
  - ii) a graph paper – provided by the Faculty
  - iii) an Answer Booklet – provided by the Faculty
  - iv) a two – page Appendix 1 (List of Formulae)
  - v) a Statistical Table – provided by the Faculty
5. Answer ALL question in English.

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**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO**

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*This examination paper consists of 6 printed page*

**QUESTION 1**

Data given below shows the expenditures (RM thousand) of four areas in health care for 2010 and 2015.

Area	2010	2015
Hospital care	120	300
Dentist's services	25	60
Drugs	40	95
Nursing Home care	30	70
Physicians' services	75	155

Draw a **multiple bar chart** for the above information and give your **comments**.

(5 marks)

**QUESTION 2**

The following table shows the length (to the nearest mm) of fifty baby carrots that were grown using special **soil A**.

Length (mm)	Number of baby carrots	f	X
150 less than 155	5		152.5
155 less than 160	2		157.5
160 less than 165	6		162.5
165 less than 170	8		167.5
170 less than 175	9		172.5
175 less than 180	11		177.5
180 less than 185	6		182.5
185 less than 190	3		187.5

- a) Calculate **mean** and **standard deviation** of the length of the baby carrots.  
(5 marks)
- b) Interpret the value of mean obtained in (a).  
(1 mark)
- c) The mean and variance of the length of baby carrots that were grown in special **soil B** are 105.5 mm and 90.25 mm respectively. Explain which soil gives a more consistent growth in length.  
(4 marks)

$$2.(a) n=50, \sum fx = 8555, \sum fx^2 = 1468462.5$$

$$\bar{x} = \frac{\sum fx}{n} = \frac{8555}{50} = 171.1 \quad \textcircled{2}$$

$$\begin{aligned} s &= \sqrt{\frac{1}{n-1} \left[ \sum fx^2 - \frac{(\sum fx)^2}{n} \right]} \\ &= \sqrt{\frac{1}{50-1} \left[ 1468462.5 - \frac{(8555)^2}{50} \right]} \quad \textcircled{3} \\ &= 9.7959 \end{aligned}$$

(b) On average, the length of the baby carrots are around 171.1 mm.

(c)

Soil A

$$\bar{x} = 171.1$$

$$s = 9.7959$$

$$CV = \frac{s}{\bar{x}} \times 100\% = \frac{9.7959}{171.1} \times 100\% = 5.72\%$$

$$= \frac{9.7959}{171.1} \times 100\% = 5.72\%$$

Soil B

$$\bar{x} = 105.5$$

$$s = \sqrt{90.25}$$

$$CV = \frac{\sqrt{90.25}}{105.5} \times 100\% = 9\%$$

$$\textcircled{3} = 9\%$$

Soil A is more consistent compared to  
Soil B.  $\textcircled{1}$

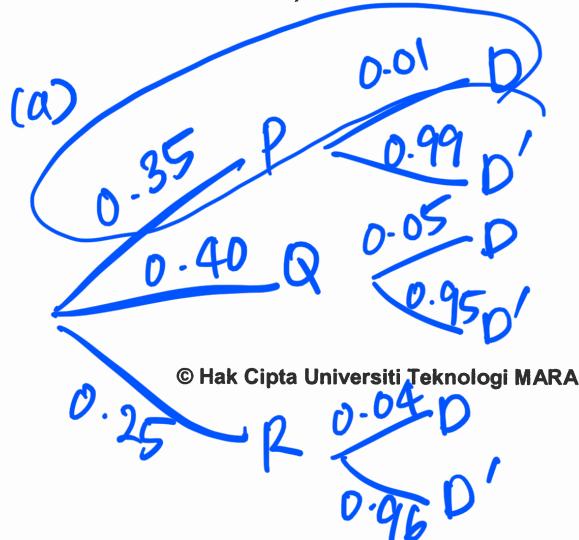
**QUESTION 3**

- a) A delegation of four members is to be formed from seven finance lecturers and five physics lecturers. Determine number of groups that can be formed if at least two finance lecturers must be in the group. (3 marks)
- b) Determine number of ways to form three-letter word from the letters M, N, P, R, A and U if repetition is not allowed and the word should end with the letter U. (2 marks)
- c) A bookstore received a shipment of 50 calculators. Five of those calculators were defective. A student came in and bought three of the calculators. Calculate the probability that
- two are defective.
  - not more than one is defective.
- (5 marks)

**QUESTION 4**

A transistor radio manufacturing factory has three machines P, Q and R. Machine P, Q and R contribute 35%, 40% and 25% respectively in the production of transistors. From past experience, machine P, Q and R produce 1%, 5% and 4% defective transistors respectively.

- a) Draw a tree diagram to represent the above events. (3 marks)
- b) A transistor is chosen at random. Calculate the probability that
- the transistor is defective.
  - the transistor is produced by machine Q given it is defective.
  - the transistor is defective and it is produced by machine P.

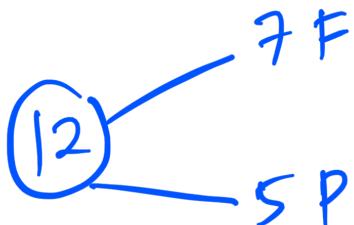


(b) i)  $P(D) = (0.35 \times 0.01) + (0.40 \times 0.05) + (0.25 \times 0.04) = 0.0335$  \*

ii)  $P(Q|D) = \frac{P(Q \cap D)}{P(D)} = \frac{0.40 \times 0.05}{0.0335} = 0.5970$  \*

iii)  $P(D \cap P) = 0.35 \times 0.01 = 0.0035$  \*

3.(a)



	F(7)	P(5)
①	2	= 4
②	3	= 4
③	0	= 4

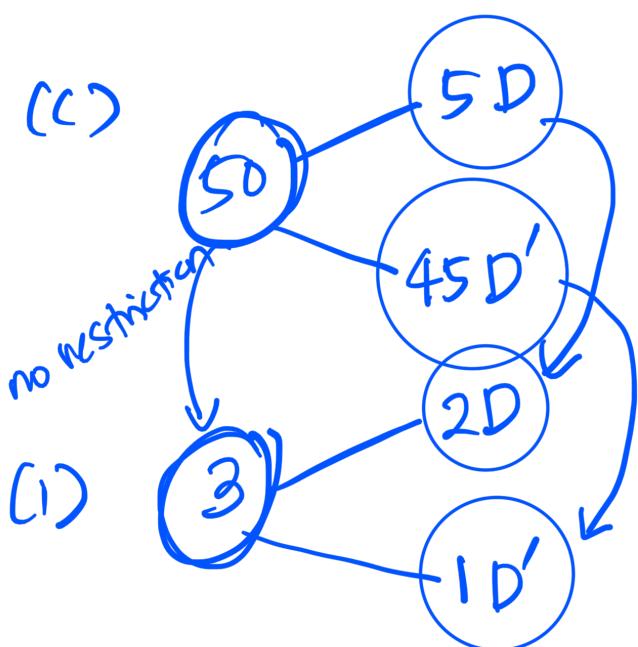
$$\textcircled{4} \rightarrow \geq 2F$$

$$({}^7C_2 \times {}^5C_2) + ({}^7C_3 \times {}^5C_1) + ({}^7C_4 \times {}^5C_0) = 420 *$$

(b)

$$\frac{5}{5} \times \frac{4}{5} \times \frac{1}{1} = 20 *$$

(c)



(i)

$$\frac{{}^5C_2 \times {}^{45}C_1}{{}^{50}C_3} = 0.0230 *$$

(ii)

$$\textcircled{3} \rightarrow \leq 1D$$

$$\frac{({}^5C_1 \times {}^{45}C_2) + ({}^5C_0 \times {}^{45}C_1)}{{}^{50}C_3} = 0.9763 *$$

D(5)	D'(45)	
1	2	= 3
0	3	= 3