<table>
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KEMENTERIAN PENDIDIKAN TINGGI
 
JABATAN MATEMATIK, SAINS DAN KOMPUTER</td><td colspan="2">COURSE CODE/
COURSE NAME</td><td colspan="2">DBM2033</td></tr>
<tr><td colspan="3"></td><td colspan="2">COURSEWORK
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<tr><td>CLO2</td><td>20 MARKS</td></tr>
<tr><td>REGISTRATION NO.</td><td></td><td>CLO3</td><td></td></tr>
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Instructions

- Answer ALL questions. Write your answers in the spaces provided.
- Show your working to get marks. You may use a non-programmable scientific calculator.

Question 1 [CLO2, C2]

Construct a truth table for $(P \rightarrow Q) \wedge (Q \rightarrow R)$. Is it a tautology?

[4 marks]

Question 2 [CLO2, C2]

Given the statements below convert the following sentences into symbolic logic form.
P: Ed goes camping.
Q: Mountain lions are near.
R: It is snowing.

[4 marks]

(a) It is snowing and Ed goes camping.
(b) It is not true that mountain lions are near but Ed does not go camping.
(c) It is a clear day or Ed does not camp.
(d) Either it is a clear day or mountain lions are near.

Question 3 [CLO2, C2]

Let $A(x)$ be the predicate "x likes running", $B(x)$ the predicate "x likes playing badminton" and $C(x)$ the predicate "x likes playing tennis" where the universe discourse is the set of all students in university.

Build each of the following quantification in English.

[6 marks]

(a) $\exists x(B(x) \wedge C(x) \wedge \sim A(x))$
(b) $\forall x\big(B(x) \rightarrow A(x)\big)$
(c) $\exists x\big(B(x) \wedge C(x)\big) \leftrightarrow \exists x A(x)$
(d) $\forall x\big(A(x) \wedge C(x)\big)$

Question 4 [CLO2, C3]

Convert each of the following into a symbolic proof and supply the justifications for each step.
[6 marks]

(a) For me to carry my umbrella it is necessary that it rain. When it rains I always wear my hat. Today I did not wear my hat. Therefore, it must not raining and so I am not carrying my umbrella.
(b) You cannot be both happy and rich. Therefore, you are either not happy, or not rich. Now you do appear to be happy. Therefore you must not be rich.