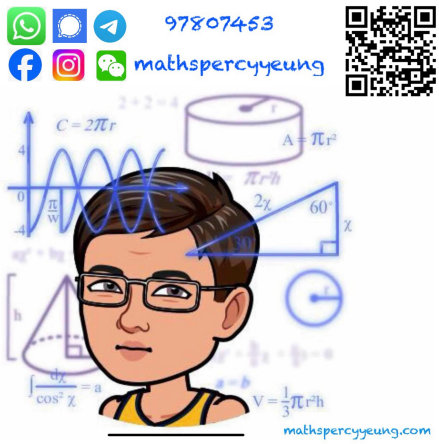
2019-20 F.4
MATH EP
M2



2019 - 2020
Form 4 1st Term Uniform Test

MATHEMATICS Extended Part
Module 2 (Algebra and Calculus)

Question–Answer Book

6th November, 2019. (Wednesday)

9:30 – 10:15 am (45 minutes)

This paper must be answered in English.

INSTRUCTIONS

1. After the announcement of the start of the examination, you should first write your name, class and class number in the spaces provided on this cover.
2. Answer ALL questions. Write your answers in the spaces provided in this Question-Answer Book.
3. Supplementary answer sheets will be supplied on request. Write your name, class, class number and mark the question number box on each sheet.
4. Unless otherwise specified, all working must be clearly shown.
5. Unless otherwise specified, numerical answers must be exact.

Grand Total	/ 31

1. Determine whether the expansion of $\left(2x^2 - \frac{3}{\sqrt{x}}\right)^{10}$ consists of

(a) a term independent of x ,

(b) a term in x .

In each part, find the term if it exists. (4 marks)

Answers written in the margins will not be marked.

2. Expand $(5+x)^4$. Hence, find the constant term in the expansion of $(5+x)^4\left(1-\frac{2}{x}\right)^3$.

(4 marks)

Answers written in the margins will not be marked.

3. Let $(1+ax)^8 = \sum_{k=0}^{8} \lambda_k x^k$ and $(b+x)^9 = \sum_{k=0}^{9} \mu_k x^k$, where a and b are constants. It is given that $\lambda_2 : \mu_7 = 7:4$ and $\lambda_1 + \mu_8 + 6 = 0$. Find a. (5 marks)

Answers written in the margins will not be marked.

4. Show that $\dfrac{1}{\csc\theta+\cot\theta}+\dfrac{\sec\theta+1}{\tan\theta}=2\csc\theta$. (3 marks)

5. Show that $\dfrac{\csc x}{\csc x\sec x-\sec x}=\dfrac{\csc x\sec x+\sec x}{\csc x}$. (4 marks)

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6. **(a)** Prove, by mathematical induction, that

$$\sum_{j=1}^{n}(-1)^j\, j^2 = \frac{(-1)^n\, n(n+1)}{2}$$

for all positive integers n.

(b) Using **(a)**, evaluate $\sum_{j=3}^{333}(-1)^{j+1}\, j^2$.

(7 marks)

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7. Prove that $C_r^n = \frac{r+1}{n+1} C_{r+1}^{n+1}$. (2 marks)

8. Solve $C_3^{n+2} = 4C_1^{n+1}$. (2 marks)

END OF PAPER

Answers written in the margins will not be marked.

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