FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session : **April 2022**

Programme : Diploma In Mechanical Engineering(DMEN)
Diploma In Electrical & Electronic Engineering (DEEI)

Course : MAT1121 / MAT1134: Engineering Mathematics 1

Date of Examination : 06 August 2022(Saturday)

Time : 08.00am-10.30am Reading Time : Nil

Duration : 02 hours 30 minutues

Note: 30 minutes is added into the duration of the examination to factor in any connectivity matters and for you to scan and upload your scripts.

Special Instructions :

This paper consists of **FOUR (4)** questions. Answer **ALL** the questions. All questions carry equal marks.

Material permitted :
Non-Programmable Scientific Calculator

Materials provided :
Mathematics Formulae Booklet

:

Examiner(s) **Chong Mee Teng** .Manickamprasad

Chief Moderator : Mohd. Hafis

This paper consists of 5 printed pages, including the cover page

DIPLOMA IN ELECTRICAL & ELECTRONIC ENGINEERING PROGRAMME (DEEI)
DIPLOMA IN MECHANICAL ENGINEERING PROGRAMME (DMEN)
MAT1121 / MAT1134: ENGINEERING MATHEMATICS 1
FINAL ALTERNATIVE ASSESSMENT: APRIL 2022 SESSION

Instruction: This paper consists of **FOUR (4)** questions. Answer **ALL** the questions. All questions carry equal marks.

Question 1

(a) Given that $\sin\alpha = \frac{\sqrt{2}}{2}$ with $0^o < \alpha < 90^o$ and $\cos\beta = \frac{\sqrt{3}}{2}$ with $270^o < \beta < 360^o$. Compute the exact value of each of the following:

(i) $\cos(\alpha - \beta)$

(3 marks)

(ii) $\tan 2\beta$

(4 marks)

(iii) $\sin 2\alpha$

(2 marks)

(b) In **Figure Q1(b)**, the famous Leaning Tower of Pisa was originally 184.5 feet high. At a distance of 123.0 feet from the base of the tower, the angle of elevation to the top is found to be 60^o. Solve:

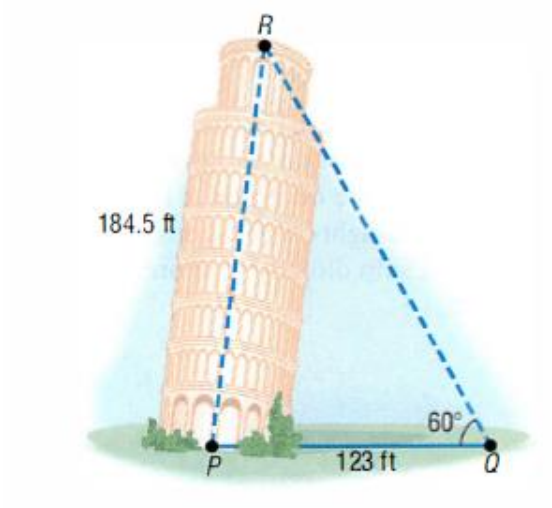

Figure Q1(b)

(i) the angle $\angle RPQ$, and

(5 marks)

(ii) the perpendicular distance from R to PQ.

(3 marks)

(c) A satelite circles the Earth in such a way that it is *y* miles from the equator, *t* minutes after its launch, where $y(t) = 3000[\cos(\frac{\pi}{45}t - \frac{2\pi}{9})]$.

(i) Compute the amplitude, period and phase shift of the satellite cycle.

(5 marks)

(ii) Sketch one cycle of the satelite orbit

(3 marks)

Question 2

(a) Use the sum-to-product formulas to prove: $\frac{\cos 3x - \cos 5x}{\sin 3x + \sin 5x} = \tan x$

(7 marks)

(b) Use the trigonometry identity to prove: $2\csc x = \frac{\sin x}{1+\cos x} + \frac{1+\cos x}{\sin x}$

(6 marks)

(c) Solve $\sin 2x = \cos x$ for $0^o \leq \theta \leq 360^o$.

(6 marks)

(d) In **Figure Q2(d)**, a ship is sailing due east when a light is observed bearing N62°10'E. After the ship has traveled 2250 m, the light bears N48°25'E. If the course is continued, solve the distance ***CL*** where the ship approach the light?

(6 marks)

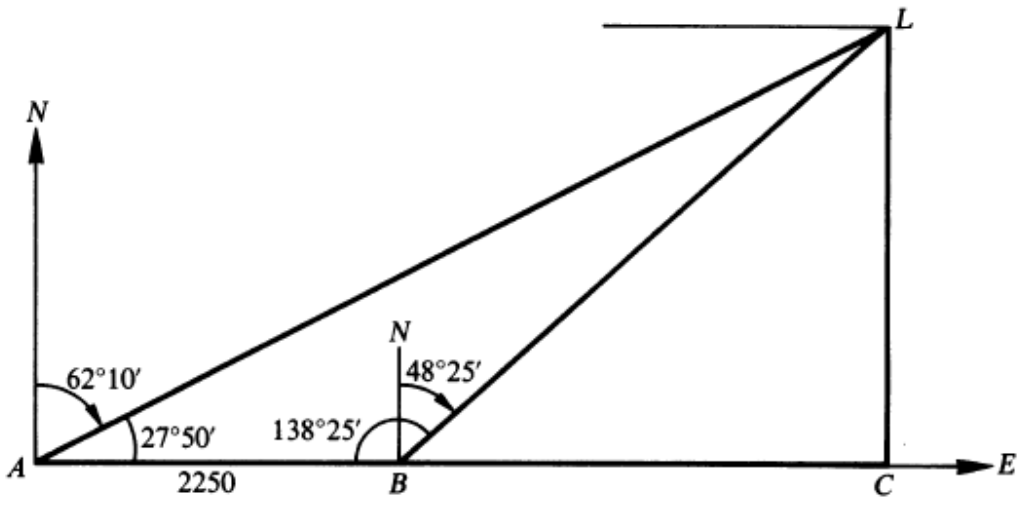

Figure Q2(d)

Question 3

(a) Using the Cosine's Law to compute the distance across the lake (*A* to *C)* in **Figure Q3(a)**.

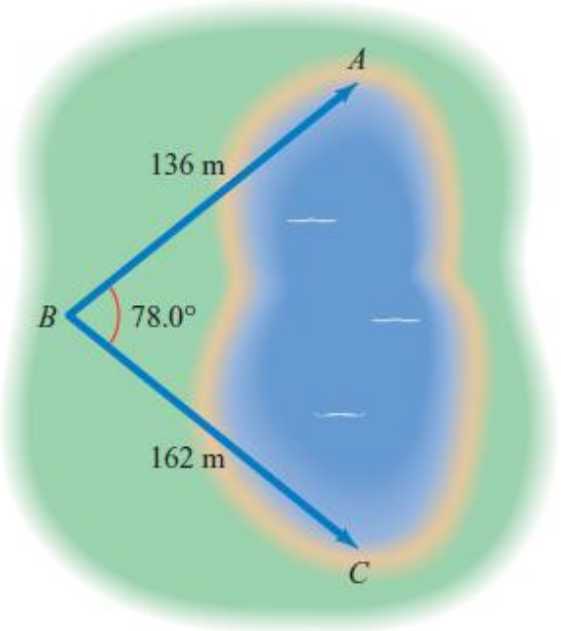

Figure Q3(a)

(5 marks)

(b) Solve the term independent of *x* in the Binomial expansion for $(2x-3)^7$.

(4 marks)

(c) Using the binomial theorem to expand $(1.04)^5$. Then compute its value to two decimal places.

(6 marks)

(d) Solve the following hyperbolic equations, correct up to 4 decimal places:

(i) $3\sinh x - 2\cosh x - 2 = 0$

(5 marks)

(ii) $2.6\cosh x + 5.1\sinh x = 8.73$

(5 marks)

Question 4

(a) (i) Compute the point in polar coordinates to Cartesian coordinates: $(5, \frac{2\pi}{3})$

(3 marks)

(ii) Compute the point in Cartesian coordinates to polar coordinates: $(-3, -4)$

(3 marks)

(b) Solve the Cartesian equation into polar equation form: $x^2 + y^2 = 6y$

(5 marks)

(c) Solve the polar equation into Cartesian equation form:

(i) $r = \frac{3}{1-2\cos\theta}$

(4 marks)

(ii) $r = \sin 2\theta$

(3 marks)

(d) Compute the height of the monument in **Figure Q4(d).**

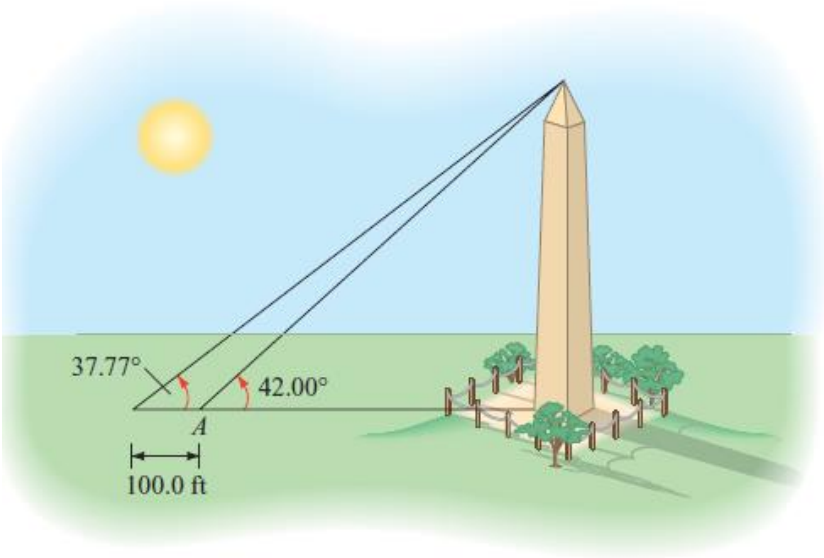

Figure Q4(d)

(7 marks)

~THE END~