TECHNICAL UNIVERSITY OF MOMBASA

Faculty of applied and health sciences

Department of mathematics and physic

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MARINE ENGINEERING

EMR 2117: ENGINEERING MATHEMATICS II

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: 2 HOURS

DATE: Pick DateSelect MonthPick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions

Answer question **ONE**(**COMPULSORY**) and any other **TWO** questions

Do not write on the question paper.

QUESTION ONE:

a)A ship leaves Mombasa (4^0 S,39^0 E) due east for 98 hours to a point K(4^0 S,80^0 E) in the indian ocean.calculate its speed in

i)km/h

ii)knots (8mks)

b) i)Given cos40=0.7660,determine cos20 without using a table (4mks)

ii)If tanX =CosX ,show that $\sin X=\frac{1\pm\sqrt{5}}{2}$ (5mks)

c)In triangle ABC,AB=6cm,AC=7cm and $<BAC=50^0$.Determine the area of triangle ABC (3mks)

d)Find all the angles between 0^0 and 360^0 which satisfy the following equations

i)$2\cos^2(x-60)=\sin 30^0$

ii)$3\cos^2 2x+2\cos 2x-1=0$ (8mks)

e)Determine the period and amplitude of the following trigonometric function

$y=1/2\cos(1/2\ x+30)$ (2mks)

Question TWO

a) i)Determine the distance in km and in nautical miles between two points P(30^0N,45^0E) and Q(30^0N,60^0W) (5mks)

ii) if the local time of London (52^0N,0^0) is 12.00 noon,determine the local time of Nairobi (1^0S,37^0E) (3mks)

b) i)derive the cosine rule . (6mks)

ii) the perimeter of a triangular field is 120m .Two of the sides are 21m and 40m.Calculate the largest angle of the fIeld. (4mks)

c) Define trigonometry (2mks)

Question THREE

a) Prove the following identities

i) $\frac{\sin 2A}{1-\cos 2A}=\cot A$ (3mks)

Ii) $\frac{\cos 2a-\cos 4a}{\sin 4a}=\operatorname{cose}2a-1$ (3mks)

b)i)Given that cos 2x=49/81,determine the sinx without using tables (3mks)

ii)without using tables determine tanA given that tan(A-45)=1/3 (3mks)

c)i) if tanA=2tanB=7 ,without using tables determine tan(2A-B) (4mks)

ii)Given cot(A-B)=8,cotA=1/4,determine without using tables cot B (4mks)

Question FOUR

a)The distance PQ across a river is to be determined .A point R is 200m from P and the angles QPR and PRQ are 81^0 and 75^0 respectively.Calculate the distance PQ. (4mks)

b)A ship starts from a point A on a bearing of 053^0 and travels up to Point C, if the bearing of A from C is 290^0, find how far C is from A and the distance from B to C (5mks)

c)In triangle ABC, $<A=41^0$, $<B=90^0$ and AC=25cm,calculate the length AB and BC (3mks)

d)i) The position vector p of a point P is $\begin{pmatrix}3\\6\end{pmatrix}$ and the position vector q of a point Q is $\begin{pmatrix}-3\\2\end{pmatrix}$.Find the vector PQ and the position vector of the midpoint M of PQ (4mks)

ii)Relative to the origin O, the points A and B have position vectors $a=\begin{pmatrix}3\\4\end{pmatrix}$ and $b=\begin{pmatrix}1\\2\end{pmatrix}$ respectively.Given that iand j are the unit vectors in the direction of x-axis and y-axis respectively,express a,b and 2(a-3b) in terms of i and j . (4mks)

Question FIVE

a) In triangle ABC, AB=6CM,AC=7CM and $<BAC=50^0$.Determine the area of the triangle ABC. (3mks)

b) Draw an isosceles triangle ABC with the base angles of 40^0 and AB=AC=8cm.

ii)locate the centroid C and the circumcentre O

ii)draw the circumcircle and measure the circumradius**.**

(6mks)

c)Given triangle ABC with BC=6cm,AB=8cm and $<ABC=90^0$ locate the orthocenter and measure AC. 4mks)

d)i)A chord 12cm long is on a circle of radius 10cm.Find the distance of the chord from the centre of the circle. (3mks)

ii)Two chords PQ and RS of the same circle are 11cm and 13 cm long respectively . if they meet at T in the circle and TR is 3cm, find PT (4mks)