SECTION I (50 MARKS)

Attempt ALL the questions in this section

1. Evaluate 3mks*Tso*

$$\frac{\frac{2}{3} - \frac{1}{5} \div \frac{1}{4}}{\frac{2}{5} \times \frac{3}{4} + 3\tfrac{1}{2}}$$

2. Find the sum of money which amount to sh. 33,320 in 3 years at 12% p.a simple interest. 3mks

3. Given that $T = \frac{1}{2}\sqrt{\frac{2}{x+y}}$, express y in terms of t, x and z. 3mks*Tso*

4. Given that $\frac{5}{\sqrt{5}} + \sqrt{20} = k\sqrt{5}$, determine the value of k. 3mks*Tso*

5 a) Expand $(1 + 3x)^5$ 2mks*Tso*

b) Hence by using the first 4 terms of the expansion, evaluate 0.97^5. 2mks*Tso*

6. Find the equation of the locus of points equidistant from the points (-1,3) and (2,4) in the form $y = mx + c$ 3mks*Tso*

7. Under a transformation presented by the matrix $\begin{pmatrix} -1 & 4 \\ 1 & 3 \end{pmatrix}$, an object whose area is $21cm^2$ is mapped onto an image. Find the area of the image 3mks*Tso*

8. Wanjiku pays for a car on hire purchase in 15 monthly instalments. The cash price of the car is Ksh. 300,000 and the interest rate is 15% p.a. A deposit of Ksh 75,000 is made Calculate her monthly repayments. 4mks*Tso*

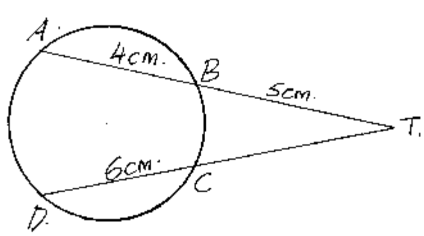
9. Solve for θ in the equation $2 \sin(2\theta + 10) = 0$ for $O^o \leq \theta \leq 360^0$. 3mks*Tso*

10. The surface area of a sphere is given as $4\pi r^2$. Find the relative error in the area if the relative error in π is 0.36 and the relative error in r is 0.24. 3mks*Tso*

11. Solve for x given $\log_{125}x + \log_{125}5x = {}^1/_3$. 4mks*Tso*

12. A tank can be filled by a tap A in 20 minutes. The same tank can be emptied when full in 30 minutes by tap B. Both taps are turned on at the same time and B turned off after 10 minutes starting with an empty tank. Find the time taken to fill the tank. 3mks*Tso*

13. In the figure below, chords AB and CD are produced to meet at T. AB = 4cm, BT = 5cm and CD = 6cm. Find the length of DT. 3mks*Tso*



14. Find the value of t if 2mks*Tso*

$$\begin{pmatrix} 1 & t & -1 \end{pmatrix} \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix} = \begin{pmatrix} -5 \end{pmatrix}$$

15. A rectangular plot has a wall on one side. 64m of fencing wire to be used to fence the three sides of the plot. The Length of the fence perpendicular to the wall is y metres. Find the value of y which gives a maximum area. 3mks*Tso*

16. The points A and B are (1,5) and (-3,7) respectively. If AB is a diameter of the circle, find the equation of this circle. 3mks*Tso*

SECTION II (50 MARKS)

Answer ANY FIVE questions in this section

17. A man goes to work by either matatu or by bus. If he goes by matatu, the probability that he will be late is $^1/_5$ while if he goes by bus, the probability that he will be late is $^1/_8$.

a) Suppose he tosses a coin to decide whether to go by matatu or by bus, what is the probability that he will be late.

b) If he travels by matatu for four successive days what is the probability that he will be late

(i) every day

ii) on any three days.

18. Mrs Okiring earns a salary of Kshs. 20,480 per month. In addition, she is given;

House allowance of ksh 20,000
Medical allowance of ksh 2476
Commuting allowance of ksh 318

She is also entitled to a tax relief of ksh. 1162 p.m.
The table gives the rate of taxation in use by them

Taxable income	**rate**
0 – 10,164	10
10,165 – 19,740	15
19,741 – 29,316	20
29,317 - 38,892	25
Over 38,892	30

a) Calculate his taxable income per month. 2mks*Tso*
b) Find how much tax she pays each month 5mks*Tso*
c) Determine her net salary if she also has the following deductions made from her monthly salary.

WCPS – sh. 392.40
Co-op loan - sh. 1970
Union dues - sh. 200

19. Use ruler and a pair of compasses only in this question
a) Construct triangle ABC such that AB = 6cm, AC=BC and angle ACB = 135^0 4mks*Tso*
b) On one side only construct the locus of P such that:
i) < APB = 67.5^0 1mk*Tso*
ii) area of triangle , APB = $9cm^2$ 3mks*Tso*
c) i) Locate P_1 and P_2 the two possible positions of P which satisfy the two conditions above 1mk*Tso*
ii) Measure the distance between P_1 and P_2. 1mk*Tso*

20. a) Complete the table below for y=sin 2x and y=sin (2x + 30) giving values to 2d.p

X	0	15	30	45	60	75	90	105	120	135	150	165	180
Sin 2x	0				0.87				-0.87				0
Sin (2x + 30)	0.5				0.5				-1				0.5

2mks*Tso*

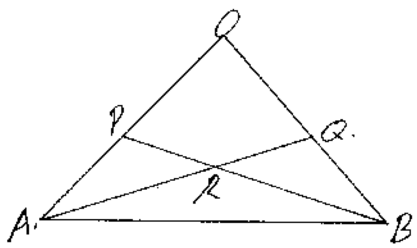
b) Draw the graphs of y=sin 2x and y = sin (2x + 30) on the axis. 4mks*Tso*

c) Use the graph to solve sin (2x + 30)-sin 2x = 0 1mk*Tso*

d) Determine the transformation which maps sin 2x onto sin (2x + 30) 1mk*Tso*

e) State the period amplitude of y = sin (2x + 30) 2mks*Tso*

21. The figure below shows a triangle OAB in which point P divides line OA in the ratio 1:2 and point Q divides OB in the ratio 1:2. AQ and PB intersect at point R.



a) Given that OA = 12$\underset{\sim}{a}$ and OB = 12$\underset{\sim}{b}$. Express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$.

i) **AB** 1mk*Tso*

ii) **PQ** 1mk*Tso*

b) Given that PR = ¼ PB, express in terms of **a** and **b**

i) **PB** 1mk*Tso*

ii) **AR** 2mks*Tso*

iii) **QR** 2mks*Tso*

c) Show that points Q, R and A lie in a straight line. 3mks*Tso*

22. The manager of Utamu yote Hotel has enough funds to buy a total of 100 crates of soft drinks of type A and type B. He wishes to buy at least twice as many crates of type A as of type B. He wants to buy a maximum of 80 crates of type A and atleast 10 crates of type B. Letting x represent the number of crates of type A and y the number of crates of type B.

a) Write down all the inequalities which represent the above information. 4mks*Tso*

b) The profit from the sale of a crate of type A is sh. 60 while that of type B is sh. 40, find the number of crates he should buy to maximize his profit. 4mks*Tso*

c) Find the profit 2mks*Tso*

23. A particle starts from rest at a point A and moves along a straight line coming to rest at another point B. During the motion, its velocity (vm/s) after time (t sec) is given by

$v = 9t^2 - 2t^3$

Calculate:

a) the time taken for the particle to reach B. 2mks*Tso*

b) the distance traveled during the first two seconds. 2mks*Tso*

c) the time taken for the particle to attain its maximum velocity. 2mks*Tso*

d) the maximum velocity attained 2mks*Tso*

e)the maximum acceleration attained during the motion. 2mks*Tso*

24. a) A stretch of a river has parallel straight banks running East – West and is 100m wide. A and B are two points on the north bank and C is a point on the opposite bank. The bearing of C from A and B are 140^0 and 210^0 respectively.

Calculate

i) the length of AC 2mks*Tso*

ii) the distance AB correct to the nearest metre. 4mks*Tso*

b) An aeroplane A flies due north from a point on latitude 40^0N and at a steady speed of 480knots. Aeroplane B starts at the same time from a point at (50^0N, 30^0E) and flies westwards along the parallel of latitude at a steady speed of 400 knots.

(i) What is the latitude of A (in degrees and minutes) When B reaches a point on 10^0W 4mks**Tso**