FACULTY OF BASIC AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
1st SEMESTER EXAMINATION, 2016 / 2017 ACADEMIC SESSION

COURSE CODE: MTH 101   **COURSE TITLE:** General Mathematics I

COURSE LEADERS: Mrs. Akinwumi Titilayo & Mr. Olopade Isaac   **DURATION:** 2 ½ Hours

INSTRUCTION:
(i) Candidates should answer **ALL** questions in SECTION **A** and any **THREE** questions in SECTION **B**.

(ii) Students are warned that possession of any unauthorized materials in an examination is a serious offence.
(iii) Students are permitted to use ONLY a scientific calculator.

SECTION A

1. Given that α and β are the roots of a quadratic equation such that $\alpha + \beta = 3$ and $\alpha\beta = 2$, find the equation.
2. Solve the equation $x^2 + 8x + 3 = 0$
3. If $(16^2)^3 = 4^x$. What is the value of x?
4. What is the sum of 9th and 12th term of the sequence with nth term $4n^2 - 2(n-1)$?
5. If $\log_8 512 = x$. Find the value of x.
6. Expand $(4x + 2a)^3$ using Pascal triangle.
7. If universal set $P = \{a,b,4,6,7\}\ and\ A = \{a,b,4\}$. Find $(A^1)^1$
8. Find the last term of $(a - 4b)^3$
9. Solve for $x\ and\ y$ in $x - y = 1\ and\ 3 = y - 2x$
10. Write the expression $\dfrac{2}{5 - 3i}$ in the form $a + ib$
11. The expression $(1 + \cos\theta)(1 - \cos\theta)$ is equivalent to?
12. Solve the equation $8^{2x-1} = \dfrac{1}{512}$
13. If $\dfrac{2}{x^2 - 4} = \dfrac{P}{x - 2} + \dfrac{Q}{x + 2}$, find the values of P and Q
14. Find the value of $\log_8 72 - \log_8\left(\dfrac{9}{8}\right)$ without using logarithm table
15. Given $P = \{1, a, b, 3, 5\}$. How many subsets will P have?
16. An exponential sequence (G.P) is given by $\dfrac{1}{27}, \dfrac{1}{12}, \dfrac{3}{16}, \dots$ what is the common ratio?

17. The expression $\dfrac{\tan\theta}{\sec\theta}$ is equivalent to?

18. Express $(4-2i)(4+3i)$ in the form $a+ib$

19. P and Q are two sets such that $n(P)=17, n(Q)=14$ and $n(P\cap Q)=5$. Find $n(P\cup Q)$

20. If $P=\{1,3,5,7\}, Q=\{2,4,6,8\}$ and $R=\{3,6,9,12\}$. Find $P\cap Q\cap R$

21. Find x if $\log_{10}5+\log_{10}(5x+1)+2=\log_{10}(x+5)+2$

22. Find the coefficient of y^4 in $(x+3y)^4$

23. Insert three arithmetic means between x and y

24. Calculate the sum to infinity of $1+\dfrac{1}{3}+\dfrac{1}{9}+\dfrac{1}{27}+...$

25. Find $(\log_{10}100)(\log_{5}5)(\log_{4}9)(\log_{3}2)$

26. Find the sum of the first 2n terms of the G.P. $2,-6,18,-54,...$

27. If $\dfrac{3^7}{81}=3^x$. Find the value of x.

28. If α and β are the roots of $4x^2-9x-16=0$. Find $\alpha+\beta$ and $\alpha\beta$

29. The 3rd and 6th terms of a linear sequence are 16 and 34 respectively. Find the first term 'a' and common difference 'd'.

30. Find the value of $\cos\beta$ if $\sin\beta=5/13$ and $0\le\beta\le90$.

SECTION B: ANSWER ANY **THREE** QUESTIONS FROM THIS SECTION

1a) The coefficient of the Fifth, Sixth and Seventh terms in the expansion $(1+x)^7$, in ascending power of x, form a linear sequence (A.P). Find the common difference.

1b) If the roots of $2x^2+5x+3=0$ are α and β, what is the value of $\alpha^2+\beta^2$

2a) If α and β are the roots of $2x^2-3x-7=0$. Find the value of $(\alpha+1)(\beta+1)$

2b) Solve the equation $\log_2 x+\log_2(x+4)=5$

3a) If $A=\{2,3,5,6,8,9,11,13,14,15\}$. List the members of the following subsets

(i) $P=\{Odd\ numbers\ of\ A\}$. (ii) $Q=\{Even\ numbers\ of\ A\}$.

(iii) $R=\{Prime\ numbers\ of\ A\}$. (iv) $S=\{Numbers\ divisible\ by\ 3\ in\ A\}$.

Hence, find;

(a) $(P'\cap Q')\cap R$ (b) $P\cap Q'\cap R\cap S'$ (c) $(P\cap Q)\cup(P\cup Q)'$

4a) Resolve $\dfrac{4x-17}{(x+4)(2x-3)}$ into partial fraction   4b) Prove that $\dfrac{2\cos^3\theta-\cos\theta}{\sin\theta\cos^2\theta-\sin^3\theta}=\cot\theta$