Note. Answer all questions. Start answering each question on a fresh page.

1. How many words, with or without meaning can be made from the letters of the word **MONDAY**, assuming that no letter is repeated, if

   (a) all letters are used at a time but first letter is a consonant,   **[1.5]**

   (b) all letters are used but the vowels come together?   **[1.5]**

2. Show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer.   **[4]**

3. If A.M. and G.M. of roots of a quadratic equation are 8 and 5, respectively, then find the roots. Hence, obtain the quadratic equation.   **[4]**

4. If the slope of a line is double of the slope of another line and tangent of the angle between them is $\frac{1}{3}$, find the slopes of the lines.   **[4]**

5. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum of the parabola $x^2 = -9y$.   **[4]**

6. Find the equation of the line which pass through origin and lies on the plane through the intersection of the planes $3x - y + 2z - 4 = 0$ and $x + y + z - 2 = 0$.   **[4]**

7. Suppose $f = \begin{cases} a + bx & x < 1 \\ 4 & x = 1, \\ b - ax & x > 1 \end{cases}$ and if $\lim\limits_{x \to 1} f(x)$ exists, what are possible values of a and b? what are the possible values of a and b so that f is continuous at $x = 1$.   **[4]**

8. Find the derivative of the function $\dfrac{4x + 5\sin x}{3e^x + 7\cos x}$ at $x = 0$.   **[3]**

$\longleftarrow \circ \bullet \circledcirc \bigstar$**Good Luck**$\bigstar \circledcirc \bullet \circ \longrightarrow$