

Note : 1- Answer only five questions

2- All questions carry equal marks

**Q1/ Evaluate the integrals by using the techniques of integration :- (choose only two)**

1-  $\int \frac{3x+2}{\sqrt{1-x^2}} dx$

2-  $\int \frac{6x+7}{(x+2)^2} dx$

3-  $\int e^x \cos x dx$

**Q2/ Find the limits :- (choose only two)**

1-  $\lim_{x \rightarrow 0} \left( \frac{\sqrt{x^2+100}-10}{x^2} \right)$

2-  $\lim_{x \rightarrow \infty} \left( \frac{5x^2+8x-3}{3x^2+2} \right)$

3-  $\lim_{x \rightarrow 0} \left( \frac{\sin 2x}{5x} \right)$

**Q3/ Water runs into a conical tank at the rate of 9 ft<sup>3</sup>/min . The tank stands point down and has a height of 10 ft and a base radius of 5 ft. How fast is the water level rising when the water is 6 ft deep?**

**Q4/ Find the volume of the solid generated by revolving the region bounded by  $y = \sqrt{x}$  and the lines  $y = 1$  ,  $x = 4$  about the line  $y = 1$ .**

**Q5/ Find the derivatives: (choose only two)**

1-  $\log_{10}(3x+1)$

2-  $y = \frac{(x^2+1)(x+3)^{\frac{1}{2}}}{x-1}$

3-  $y = \ln(x^2+4) - x \tan^{-1} \left( \frac{x}{2} \right)$

**Q6/ Find an equation for the line perpendicular to the tangent to the curve**  
 **$y = x^3 - 4x + 1$  at the point ( 2 , 1 ) .**

**Good Luck**

**Head of the Dep. *Dr. Aysar T. Jarullah***