PART-B

(50 Marks)

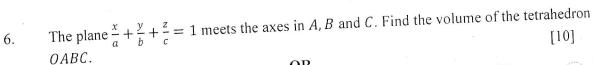
[10]

Use Laplace transforms, solve y''(t) + 5y'(t) + 6y(t) = t, y(0) = 1, y'(0) = 1. Solve by using Laplace transforms $y'' + 4y' + 3y = e^{-t}$ with y(0) = y'(0) = 1. [10] [10]

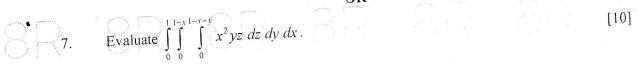
Prove that $\int_0^1 \frac{x^2 dx}{\sqrt{1-x^4}} \times \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{\pi}{4\sqrt{2}}$ using $\beta - \Gamma$ functions. 4.

Prove that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$ Prove that $\beta(m,n) = \frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)}$ [5+5]

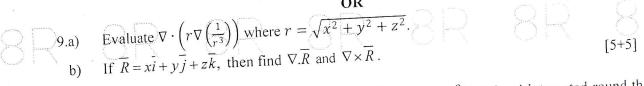




OR



8. Prove that if \vec{r} is the position vector of any point in space then $r^n \vec{r}$ is irrotational and is solenodial if n = -3.



- 10. Verify Stoke's theorem for the vector field $\vec{F} = (x^2 y^2)i + 2xyj$ integrated round the rectangle in the plane z = 0 and bounded by the lines x = 0, y = 0, x = a, y = b. [10]
- Verify divergence theorem for $2x^2yi y^2j + 4xz^2k$ taken over the region of first octant of the cylinder $y^2 + z^2 = 9$ and x = 2.

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