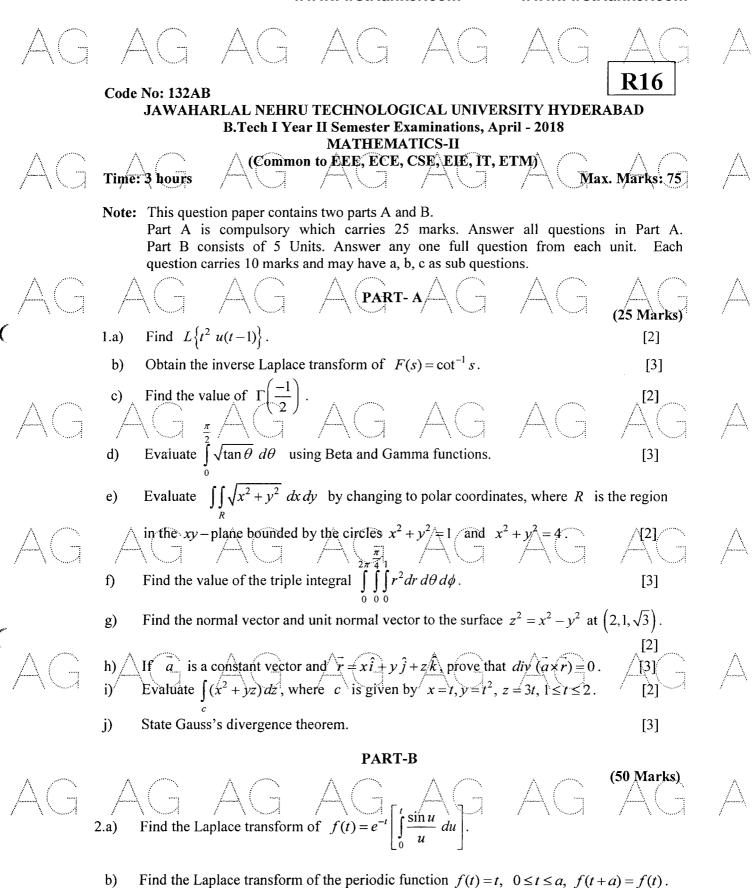


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3.a)

using convolution theorem.

Solve the initial value problem $y'' + 3y' + 2y = e^{-t}$, y(0) = 0, y'(0) = -1 using Laplace b)



4.a)

Prove that $\beta(m,n) = \int_{0}^{1} \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx$.

[5+5]

OR /

Prove that $\beta(m,n) = 2 \int_{-\infty}^{\infty} \sin^{2m-1}\theta \cos^{2n-1}\theta d\theta = \beta(m+1,n) + \beta(m,n+1)$. 5.a)

 $\int_{0}^{1} x^{m} (\ln x)^{n} dx = \frac{(-1)^{n} n!}{(m+1)^{n+1}}$

where m > 1 and n is a positive integer.

Change the order of integration in $\int \int xy \, dx \, dy$ and hence evaluate the same. 6.a)

b)

Find the area of the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$.

where v is the space in the first octant below the

plane 3x+2y+z=6. Find the volume of the solid enclosed between the surfaces $x^2 + y^2 = 4$ and $x^2 + z^2 = 4$. b)

Find the values of \underline{a} and \underline{b} so that the surface $\underline{ax^2} - by z = \underline{a+2}$ is orthogonal to the surface $4x^2y + z^3 = 4$ at (1, -1, 2).

Find the directional derivative of the scalar function f(x, y, z) = x y z at (1, 4, 9) in the b) direction of the line from (1, 2, 3) to (1, -1, -3).

If $\vec{r} = x \hat{i} + y \hat{j} + z \hat{k}$ and $r = |\vec{r}|$, show that ∇



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10.a) Show that $\int (2xy+3)dx + (x^2-4z)dy - 4y dz$, where c is any path joining (0, 0, 0) to (1, -1, 3), does not depend on the path c and evaluate the integral. Apply Stoke's theorem to evaluate $\oint (x+y) dx + (2x-z) dy + (y+z) dz$, where c is the boundary of the triangle with vertices (2, 0, 0) (0,3,0) and (0,0,6). Verify Green's theorem for $\oint e^{-x} (\cos y \, dx - \sin y \, dy)$, where c is the rectangle with vertices (0,0), $(\pi,0)$, $(\pi,\frac{\pi}{2})$ and $(0,\frac{\pi}{2})$. G AG AG AG AG --ooOoo---A() $A(\cdot)$ AG AG AG AG AG