KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Technology)
I Semester Final Re - Examination – February 2025
2023 & Previous admission

Beas.1102 **Engineering Mathematics I (2+0)** **Marks: 50**
Time: 2 hours

I **Fill in the blanks** **(10x1=10)**

1. $\text{Lt}_{x\to 0} \frac{e^x-1}{x}$ = ----------
2. If u = xy *then* $\frac{\partial^2 u}{\partial x \partial y}$ = ----------
3. If z is a function of two variables x and y ,then dz =----------
4. The differential equation M dx+ N dy =0 is exact if ----------
5. Solution of the differential equation $y^{II}+4y^{I}+4y = 0$ is ----------
6. Legendre polynomial $P_0(x)$ = ----------
7. $\frac{d}{dx}(x^n J_n(x))$ = ----------
8. If $\vec{F} = x\hat{\imath} + y\hat{\jmath} + az\,\hat{k}$ is solenoidal a = ----------
9. If $\varphi = x^2 + y^2$ then grad φ = ----------
10. By stoke's theorem $\int_C \vec{F}.d\vec{r}$ = ----------

II **Write short notes on ANY FIVE of the following** **(5x2=10)**

1. Find $\frac{dy}{dx}$ if $y^2 = 4ax$.
2. State Euler's theorem for homogeneous function.
3. Write one integrating factor used for converting a differential equation to an exact differential equation.
4. Write the generating function of Legendre Polynomials.
5. Find the singular points of $x^2\,y^{II}+xy^{I}+(x^2-n^2)y = 0$.
6. Write the formula for finding $\nabla.(\varphi\vec{f})$
7. State Green's theorem.

III **Answer ANY FIVE of the following** **(5x4=20)**

1. If $z = u^2 + v^2$ and $u = at^2, v = 2at$ then find $\frac{dz}{dt}$.
2. Find Maclaurin series expansion of e^{2x}
3. If $x = r\cos\theta$, $y = r\sin\theta$ find $\frac{\partial(x,y)}{\partial(r,\theta)}$
4. If w = f(u, v) where u = x + y , v = x-y , show that $\frac{\partial w}{\partial x} + \frac{\partial w}{\partial y} = 2\frac{\partial w}{\partial u}$
5. Solve (2xlogx-xy)dy+2ydx = 0
6. Solve $y^{II} + 4y = \sin 3x$
7. Find the value of n for which $r^n\vec{r}$ is solenoidal.

IV **Write an essay on ANY ONE of the following** **(1x10=10)**

1. Solve $\frac{dx}{dt} + \frac{dy}{dt} + 2x + y = 0$
   $\frac{dy}{dt} + 5x + 3y = 0$
2. Verify Stock's theorem for $\int_C [(2x-y)dx - yz^2dy - y^2zdz]$, where C is the circle $x^2 + y^2 = 1$ and S is the surface of unit sphere.

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