JYOTHY INSTITUTE OF TECHNOLOGY

TATAGUNI, BENGALURU

AFFILIATED TO VTU, BELAGAVI

CALCULUS AND DIFFERENTIAL EQUATIONS (21MAT11)

ASSIGNMENT (MODULE 2,3,4)

1. If u = f (x/y, y/z, z/x) then prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=0$
2. If x + y + z = u, y + z = v, z = uvw, then show that $\frac{\partial(x,y,z)}{\partial(u,v,w)}=uv$
3. Evaluate (a) $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}$ (b) $\lim_{x\to 0}(a^x+x)^{1/x}$ (c) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x}{3}\right)^{1/x}$
4. Find the extreme values of the function $f(x,y)=x^3+y^3-3x-12y+20$
5. Solve $x^2y''+4xy'+2y=e^x$
6. Solve $(4D^4-8D^3-7D^2+11D+6)y=0$
7. Solve $(D^2-4D+3)y = Sin3x\,Cos2x$
8. Solve $(D^2+4)y = x^2+e^{-x}$
9. Solve $(D^2+3D+2)y=1+3x+x^2$
10. Solve the DE $y''+a^2y=\sec(ax)$ by the method of variation of parameters
11. Solve the DE $y''+y=\tan x$ by the method of variation of parameters
12. Solve $y''x^2-xy'+y=\log x$
13. Solve $y''(2x+1)^2-2(2x+1)y'-12y=6x+5$
14. Solve $(Px-y)(Py+x)=a^2P$, use the substitution $X=x^2$, $Y=y^2$
15. If the temperature of the air is 30℃ and the substance cools from 100℃ to 70℃ in 15 minutes. Find how long will it take for the metal ball to reach a temperature of 40℃.
16. Solve $(3x^2y^4+2xy)dx+(2x^3y^3-x^2)dy=0$
17. Solve $xy\left(1+xy^2\right)\frac{dy}{dx}=1$

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