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PES UNIVERSITY, BANGALORE-85

(Established under Karnataka Act 16 of 2013) **14MA101**

END SEMESTER ASSESSMENT

B. Tech, I SEM, May-2019

ENGINEERING MATHEMATICS-I

(Common for All Branches)

Sub Code: **14MA101**

Time: 3 Hrs — Answer All Questions — Max Marks: 100

1.	a)	Find the nth order derivative of $y = \cos^6 x$	7
	b)	Show that for the curve $r\cos\left(\frac{\sqrt{a^2-b^2}}{a}\right)\theta = \sqrt{a^2-b^2}$, $p^2(r^2+b^2) = a^2r^2$	7
	c)	Show that for the curve $r(1-\cos\theta) = 2a$, ρ^2 varies as r^3	6
2.	a)	If $u = f(r)$, where $r = \sqrt{x^2+y^2+z^2}$, show that $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}+\frac{\partial^2 u}{\partial z^2} = f''(r)+\frac{2}{r}f'(r)$	7
	b)	Transform the equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ in to polar coordinates.	7
	c)	Find u_x $u_y, u_{xx}, u_{yy}, u_{xy}$ and u_{yx} for $u = x^3+y^3+x^2y+xy^2$	6
3.	a)	Trace the curve $r = a\cos 2\theta$	7
	b)	Change the order of the integration in the integral $\int_0^1\int_{\sqrt{y}}^{2-y} xy\,dx\,dy$ and hence evaluate it.	7
	c)	Evaluate $\int_0^1\int_1^2\int_0^2 x^2yz^2\,dz\,dy\,dx$	6
4.	a)	Find the orthogonal trajectories of the curve $y = cx^2$ where c is a parameter.	7
	b)	Solve: $y(2x-y+1)dx+x(3x-4y+3)dy=0$	7
	c)	Solve: $\frac{dy}{dx}-y\tan x = \frac{\sin x\cos^2 x}{y^2}$	6
5.	a)	Solve: $(D-2)^2y = 8(e^{2x}+\sin 2x+x^2)$	7
	b)	Solve: $x^4y'''+2x^3y''-x^2y'+xy = \sin(\log x)$	7
	c)	Solve: $(D^2-1)y = \frac{2}{1+e^x}$ by variation of parameters.	6