DAYANANDA SAGAR COLLEGE OF ENGINEERING

(An Autonomous Institute Affiliated to VTU, Belagavi)

Shavige Malleshwara Hills, Kumaraswamy Layout, Bengaluru-560078

Department of Mathematics

Second Semester B.E. (Autonomous)

Course: Engineering Mathematics-II Course Code: 18MA2ICMAT

Question Bank

Module 2. Variable Coefficients & Partial Differential Equations

Question Number	Question	Appeared in VTU Examination	
		Year	Marks
1.	a)Solve: $x^2\frac{d^2y}{dx^2}-3x\frac{dy}{dx}+4y=(1+x^2)$	2003	
	b)Solve: $x^2y''+xy'+9y=3x^2sin(3logx)$	2008	
2.	a)Solve: $x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}+2y=logx\,sin(logx)$	2011	
	b) Solve: $x^2\frac{d^2y}{dx^2}-(2m-1)x\frac{dy}{dx}+(m^2+n^2)y=n^2x^m logx$	June 2014	07
3.	a) Solve: $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}+2y=x$	2005	
	b) Solve: $x^2y''+xy'+y=2cos^2(logx)$	2005	
4.	a)Solve: $(1+x)^2\frac{d^2y}{dx^2}+(1+x)\frac{dy}{dx}+y=2\sin[log(1+x)]$	2012	
	b)Solve: $(2x-1)^2\frac{d^2y}{dx^2}+(2x-1)\frac{dy}{dx}-2y=8x^2-2x+3$	2006	
5.	a)Solve: $(3x-2)^2\frac{d^2y}{dx^2}-3(3x-2)\frac{dy}{dx}=9(3x-2)\sin(\log(3x-2))$	Feb 2005	06
	b)Solve: $(3x+2)^2\frac{d^2y}{dx^2}+3(3x+2)\frac{dy}{dx}-36y=8x^2+4x+1$	Feb 2005	06
6.	a)Solve $(2x+1)^2\frac{d^2y}{dx^2}$ -6$(2x+1)\frac{dy}{dx}$ +16y = 8$(2x+1)^2$		07
	b) Solve: $(2x+1)^2\frac{d^2y}{dx^2}$ -2$(2x+1)\frac{dy}{dx}$ - 12y = x log(2x+1)	July 2016	06
7.	a)Find the differential equations of all planes which are at a constant distance a from the origin.	2009	
	b) Form the PDE by eliminating arbitrary functions from $z=\varphi(x+ay)+\psi(x-ay)$	Aug 2005	06
8.	a)Form the PDE corresponding to z = $(x-a)^2$+$(y-b)^2$	Aug. 2013	05
	b) Form the PDE of z = y f(x) + x ∅(y), where f & ∅ are arbitrary functions.	Jan. 2013	06
9.	a) Form the P.D.E by eliminating arbitrary constants a, b given $z=xy+y\sqrt{x^2-a^2}+b$		
	b)Form the P.D.E by eliminating arbitrary function $z=y^2+2f(\frac{1}{x}+logy)$	Aug 2005	07
10.	a) Form a partial differential equation by eliminating arbitrary functions from the relation $\emptyset(xy+z^2, x+y+z)=0$	Jan. 2015	05

	b)Form the P.D.E by eliminating arbitrary constants a, b, c from $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$	Jan. 2015	05
11.	a)Form the P.D.E from $z = yf(y/x)$	Aug 2002	05
	b) Form a partial differential equation by eliminating arbitrary functions from the relation $f(x^2+y^2,\ z-xy)=0$		06
12.	a)Solve $\frac{\partial^3 z}{\partial x^2 \partial y}+18xy^2+\sin(2x-y)=0$	2010	
	b)Solve $\frac{\partial^3 z}{\partial x^2 \partial y}=\cos(2x+3y)$	2014	
13.	a)Solve $\frac{\partial^2 z}{\partial x \partial y}=x^2y$ subject to the conditions $z(x,0)=x^2$ and $\frac{\partial z}{\partial y}(1,y)=cosy$		
	b)Solve $\frac{\partial^2 u}{\partial x^2}=\mathrm{x}+\mathrm{y}$		
14.	a)Solve $\frac{\partial^2 z}{\partial x \partial y}=\mathrm{sinx\ siny}$ for which $\frac{\partial z}{\partial y}=-2siny$ when $x=0$ and $z=0$ if y is an odd multiple of $\frac{\pi}{2}$[$or z=0\ if\ y=(2n+1)\frac{\pi}{2}$]		
	b)Solve $\frac{\partial^2 z}{\partial x^2}=\mathrm{xy}$ subject to the conditions that $\frac{\partial z}{\partial x}=\log(1+y)$ when x=1 and z=0 when x=0		
15.	a) Solve $\frac{\partial^2 z}{\partial x \partial y}=\frac{x}{y}$ subject to the conditions that $\frac{\partial z}{\partial x}=log_e x$ when y=1 and z=0 when x=1	2010	
	b)Solve $(x^2-yz)p+(y^2-zx)q=z^2-xy$		
16.	a)Solve $(mz-ny)p+(nx-lz)q=(ly-mx)$	Jan. 2007	06
	b)$Solve\ x(y^2-z^2)p+y(z^2-x^2)q=z(x^2-y^2)$		06
17.	a) Solve: $x^2(y-z)p+y^2(z-x)q=z^2(x-y)$		07
	b) Solve: $x^2p+y^2q=z^2$	July 2007	05
18.	a)Solve: $x(y^2+z)p-y(x^2+z)q=z(x^2-y^2)$		
	b) Solve: $p\ cotx+q\ coty=cotz$		
19.	Obtain various possible solution of one dimensional heat equation by variable separable method		
20.	Obtain various possible solution of one dimensional wave equation by variable separable method		