SRM Institute of Science and Technology

Ramapuram Campus

Department of Mathematics

Question Bank of Module-3(Application of PDE)

(2020–2021-ODD)

Subject.Code: 18MAB201T

Subject.Name: Transforms and Boundary Value Problems

Year/Sem: II/III **Part-A (1*20=20)** **Branch: Common to All branches**

1.	The proper solution of the problems on vibration of string is	1 mark	
	(a) $y(x,t) = (Ae^{\lambda x} + Be^{-\lambda x})(Ce^{\lambda at} + De^{-\lambda at})$ (b) $y(x,t) = (Ax + B)(Ct + D)$ (c) $y(x,t) = (A\cos\lambda x + B\sin\lambda x)(C\cos\lambda at + D\sin\lambda at)$ (d) $y(x,t) = (Ax + B)$	Ans (c)	(CLO-3 Remember)
2.	The one dimensional wave equation is	1 mark	
	(a) $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ (b) $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$ (c) $\frac{\partial y}{\partial t} = a \frac{\partial^2 y}{\partial x^2}$ (d) $\frac{\partial^2 y}{\partial x^2} = a \frac{\partial^2 y}{\partial t^2}$	Ans (b)	(CLO-3 Remember)
3.	In wave equation $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$, a^2 stands for	1 mark	
	(a) $\frac{T}{m}$ (b) $\frac{k}{c}$ (c) $\frac{m}{T}$ (d) $\frac{k}{m}$	Ans (a)	(CLO-3 Remember)
4.	In heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, α^2 stands for	1 mark	
	(a) $\frac{k}{\rho}$ (b) $\frac{T}{m}$ (c) $\frac{k}{\rho x}$ (d) $\frac{k}{c}$	Ans (c)	(CLO-3 Remember)
5.	The one dimensional heat equation in steady state is	1 mark	
	(a) $\frac{\partial u}{\partial t} = 0$ (b) $\frac{\partial^2 u}{\partial t^2} = 0$ (c) $\frac{\partial^2 u}{\partial x^2} - \frac{\partial u}{\partial t} = 0$ (d) $\frac{\partial^2 u}{\partial x^2} = 0$	Ans (d)	(CLO-3 Remember)

6.	The proper solution of $u_t = \alpha^2 u_{xx}$ is	1 mark	
	(a) $u = (Ax + B)C$ (b) $u = (A\cos\lambda x + B\sin\lambda x)e^{-\alpha^2\lambda^2 t}$ (c) $u = (Ae^{\lambda x} + Be^{-\lambda x})e^{\alpha\lambda t}$ (d) $u = At + B$	Ans (b)	(CLO-3 Remember)
7.	The proper solution in steady state heat flow problems is	1 mark	
	(a) $u = (Ae^{\lambda x} + Be^{-\lambda x})e^{\alpha\lambda t}$ (b) $u = Ax + B$ (c) $u = (A\cos\lambda x + B\sin\lambda x)e^{-\alpha^2\lambda^2 t}$ (d) $u = (Ae^{\lambda x} + Be^{-\lambda x})(Ce^{\lambda at} + De^{-\lambda at})$	Ans (b)	(CLO-3 Remember)
8.	The one dimensional heat equation is	1 mark	
	(a) $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ (b) $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ (c) $\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2}$ (d) $\frac{\partial u}{\partial x} = \alpha^2 \frac{\partial^2 u}{\partial t^2}$	Ans (b)	(CLO-3 Remember)
9.	How many initial and boundary conditions are required to solve $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$	1 mark	
	(a) Four (b) Two (c) Three (d) Five	Ans (c)	(CLO-3 Remember)
10.	How many initial and boundary conditions are required to solve $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$	1 mark	
	(a) Two (b) Three (c) Five (d) Four	Ans (d)	(CLO-3 Remember)
11.	One dimensional wave equation is used to find	1 mark	
	(a) Temperature (b) Displacement (c) Time (d) Mass	Ans (b)	(CLO-3 Remember)
12.	One dimensional heat equation is used to find	1 mark	
	(a) Density (b) Temperature distribution (c) Time (d) Displacement	Ans (b)	(CLO-3 Remember)
13.	Heat flows from_____temperature	1 mark	
	(a) Higher to Lower (b) Uniform (c) Lower to higher (d) Stable	Ans (a)	(CLO-3 Remember)
14.	The tension T caused by stretching the string before fixing it at the end points is	1 mark	

	(a) Increasing (b) Decreasing (c) Constant (d) Zero	Ans (c)	(CLO-3 Remember)
15.	A string is stretched between two fixed points x = 0 and x = l. The initial conditions are	1 mark	
	(a) $y(0, t) = 0, y(x,t) = 0$ (b) $y(x, 0) = 0, \frac{\partial y}{\partial t}(x, 0) = 0$ (c) $y(0, t) = 0, y(l, t) = 0$ (d) $\left(\frac{\partial y}{\partial x}\right)_{(0,t)} = 0, \left(\frac{\partial y}{\partial x}\right)_{(l,t)} = 0$	Ans (c)	(CLO-3 Apply)
16.	The amount of heat required to produce a given temperature change in a body is proportional to	1 mark	
	(a) Weight of the body (b) Mass of the body (c) Density of the body (d) Tension of the body	Ans (b)	(CLO-3 Remember)
17.	The general solution for the displacement y(x,t) of the string of length l vibrating between fixed end points with initial velocity zero and initial displacement f(x) is	1 mark	
	(a) $\sum B_n \sin\left(\frac{n\pi x}{l}\right)\cos\left(\frac{n\pi at}{l}\right)$ (b) $\sum B_n \sin\left(\frac{n\pi x}{l}\right)\sin\left(\frac{n\pi at}{l}\right)$ (c) $\sum B_n \cos\left(\frac{n\pi x}{l}\right)\sin\left(\frac{n\pi at}{l}\right)$ (d) $\sum B_n \sin\left(\frac{n\pi x}{l}\right)$	Ans (a)	(CLO-3 Remember)
18.	The steady state temperature of a rod of length l whose ends are kept at 30° and 40° is	1 mark	
	(a) $u = \frac{10x}{l} + 30$ (b) $u = \frac{20x}{l} + 30$ (c) $u = \frac{10x}{l} + 20$ (d) $u = \frac{10x}{l}$	Ans (a)	(CLO-3 Apply)
19.	When the ends of a rod is non-zero for one dimensional heat flow equation, the temperature function u(x, t) is modified as the sum of steady state and transient state temperatures. The transient part of the solution which	1 mark	
	(a) Increases with increase of time (b) Decreases with increase of time (c) Increases with decrease of time (d) Decreases with decrease of time	Ans (b)	(CLO-3 Remember)
20.	A rod of length l has its ends A and B kept at 0° and 100° respectively, until steady state conditions prevail. Then the initial condition is given by	1 mark	
	(a) $u(x, 0) = ax + b + 100l$ (b) $u(x, 0) = \frac{100x}{l}$ (c) $u(x, 0) = 100xl$ (d) $u(x,0) = (x + l)100$	Ans (b)	(CLO-3 Apply)

21.	In wave equation $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$, a^2 stands for	1 mark	
	(a) $\frac{Tension}{Mass}$ (b) $\frac{Temperature}{Mass}$ (c) $\frac{Time}{Mass}$ (d) $\frac{Mass}{Time}$	Ans (a)	(CLO-3 Remember)
22.	In heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, α stands for	1 mark	
	(a) diffusivity (b)time (c) tension (d) mass	Ans (a)	(CLO-3 Remember)
23.	In heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, $\alpha = \frac{k}{\rho c}$, here k stands for	1 mark	
	(a)Thermal conductivity (b)time (c) zero (d) mass	Ans (a)	(CLO-3 Remember)
24.	In heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, $\alpha = \frac{k}{\rho c}$, here ρ stands for	1 mark	
	(a) density (b) tension (c)mass (d) zero	Ans (a)	(CLO-3 Remember)
25.	In heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, $\alpha = \frac{k}{\rho c}$, here c stands for	1 mark	
	(a) specific heat (b) tension (c)mass (d) zero	Ans (a)	(CLO-3 Remember)
26.	In heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, the steady state condition is	1 mark	
	(a) $\frac{\partial u}{\partial t} = 0$ (b) $\frac{\partial^2 u}{\partial t^2} = 0$ (c) $\frac{\partial^2 u}{\partial x^2} - \frac{\partial u}{\partial t} = 0$ (d) $\frac{\partial u}{\partial x} = 0$	Ans (a)	(CLO-3 Remember)
27.	In heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$, the unsteady state solution is	1 mark	
	(a) $u = (Ax + B)C$ (b) $u = (A\cos\lambda x + B\sin\lambda x)e^{-\alpha\lambda t}$ (c) $u = (Ae^{\lambda x} + Be^{-\lambda x})e^{\alpha\lambda t}$ (d) $u = At + B$	Ans (b)	(CLO-3 Remember)
28.	If $B^2 - 4AC = 0$, then the 2nd order partial differential equation is classified as	1 mark	

	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (c)	(CLO-3 Remember)
29.	If $B^2 - 4AC < 0$, then the 2nd order partial differential equation is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (a)	(CLO-3 Remember)
30.	If $B^2 - 4AC > 0$, then the 2nd order partial differential equation is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (b)	(CLO-3 Remember)
31.	The one dimensional heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (c)	(CLO-3 Remember)
32.	The one dimensional wave equation $\frac{\partial^2 y}{\partial t^2} = \alpha^2 \frac{\partial^2 y}{\partial x^2}$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (b)	(CLO-3 Remember)
33.	The partial differential equation $u_{xx} + 2u_{xy} + u_{yy} = 0$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (c)	(CLO-3 Remember)
34.	The partial differential equation $xf_{xx} + yf_{yy} = 0$, $x > 0, y > 0$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (a)	(CLO-3 Remember)
35.	The partial differential equation $xf_{xx} + yf_{yy} = 0$, $x < 0, y > 0$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (b)	(CLO-3 Remember)
36.	The partial differential equation $u_{xx} + 4u_{xy} + 4u_{yy} = 0$ is classified as	1 mark	

	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (c)	(CLO-3 Remember)
37.	The partial differential equation $2u_{xx} + 3u_{xy} + 4u_{yy} = 0$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (a)	(CLO-3 Remember)
38.	The partial differential equation $u_{xx} - 3u_{xy} + 2u_{yy} = 0$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (b)	(CLO-3 Remember)
39.	The partial differential equation $f_{xx} + f_{xy} + f_{yy} + f_y = 0$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (a)	(CLO-3 Remember)
40.	The partial differential equation $2f_{xx} - f_{xy} - f_{yy} + 2f_y = 0$ is classified as	1 mark	
	(a) Elliptic (b) Hyperbolic (c)parabolic (d) Laplace equation	Ans (b)	(CLO-3 Remember)