QUAID-I-AZAM UNIVERSITY
ISLAMABAD
PhD Admission Test, Fall 2020

Max Marks: **100**

SUBJECT: **MATHEMATICS**   Pass Marks: **70**

CATEGORY: **Applied Mathematics**   Time Allowed: **50 Minute**

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(1) An ODE together with initial conditions is called ....
(a) Initial value problem (b) Boundary value problem
(c) Initial and boundary value problem (d) Non of the these

(2) The solution of an ODE is represented by a ....
(a) Point (b) Curve(c) Plane (d) None of the these

(3) The general solution of a second order ODE contains .... arbitrary constants
(a) 0 (b) 2 (c) 4 (d) 6

(4) $x^2y'' + xy' + y = 0$ is the standard form of the ......
(a) Euler-Cauchy equation (b) Euler-Lagrange equation
(c) Euler-Poincare equation (d) Euler-Legendre equation

(5) If $y_1, y_2, ..., y_n$ are linearly independent solutions of an n-th order ODE then Wronskian of these solution ....
(a) must be positive (b) must be negative
(c) must vanish (d) Non of these

(6) A general solution of non-homogeneous ODE on the interval I is the sum of complementary solution and ....
(a) Particular integral (b) Singular integral
(c) Multiple integral (d) Gaussian integral

(7) A quasilinear PDE: $Au_{xx} + 2Bu_{xy} + Cu_{yy} = F(x, y, u, u_x, u_y)$ is called hyperbolic if
(a) $AC - B^2 < 0$ (b) $AC - B^2 = 0$
(c) $AC - B^2 > 0$ (d) Non of these

(8) The Heat equation is also known as ..... equation
(a) Fusion (b) diffusion (c) effusion (d) Non of these

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(9) Mathematical modeling of vibration of rectangular membrane results in .... equation
(a) Heat (b) Wave (c) Poisson (d) Helmholtz

(10) First boundary value problem for PDE's is also known as ..... problem
(a) Neumann (b) Dirichlet (c) Robin (d) Non of these

(11) A solution of $x = g(x)$ is called .... point of g
(a) Multiple (b) Singular (c) Non-singular (d) Fixed

(12) Strictly diagonally dominant matrices are .....
(a) Singular (b) Non-singular (c) Plural (d) Non-plural

(13) Newton Raphson method is ..... convergent
(a) Linearly (b) Quadratically (c) Cubically (d) Non of these

(14) Global error of fourth order Runge-Kutta method is .....
(a) $O(h)$ (b) $O(h^2)$ (c) $O(h^3)$ (d) $O(h^4)$

(15) ADI is a method to solve system of PDE's. ADI stand for .....
(a) Alternating direction implicit (b) Advance difference integral
(c) Amplitude deviation inequality (d) Non of these

(16) A vector of length +1 is called a ..... vector
(a) Unit (b) Positive (c) Negative (d) Non of these

(17) Inner product of two vectors gives maximum value when vectors are oriented in ..... direction
(a) Same (b) Opposite (c) Perpendicular (d) Non of these

(18) The resultant vector of the cross product of two vectors is ..... to the plane containing these vectors
(a) Inclined (b) Parallel (c) Perpendicular (d) Non of these

(19) Three vectors in $\mathbb{R}^3$ are .... if and only if their scalar triple product is not equal to zero
(a) Linearly dependent (b) Linearly independent
(c) Non-Linearly dependent (d) Nonlinearly independent

(20) The direction of gradient vector to a given surface is ...... to the surface
(a) Normal (b) Inclined (c) Parallel (d) Non of these

(21) If Z is a complex number then $\bar{Z}$ is its reflection in the ..... axes
(a) Imaginary (b) Real (c) Conjugate (d) Non of these

(22) If $f(z)$ is analytic in a simply connected domain D then the integral of $f(z)$ is ..... of path in D
(a) Independent (b) Dependant (c) Length (d) Non of these

(23) The derived series of a power series has the ..... radius of convergence as the original series
(a) Double (b) Multiple (c) Equal (d) Non of these

(24) Weiestrass M-test is used for ....
(a) Convergence (b) Uniform convergence
(c) Divergence (d) Non of these

(25) The singularity of $f(z)$ at $z = z_0$ is called a ....
(a) Residue (b) Dipole (c) Pole (d) Tripole

Dr. Amjad Hussain (Focal Person for PhD Admission Test)