Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **15MA3008** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Partial Differential Equations** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Prove that the general solution of the linear Partial Differential Equation  can be written in the form  where is an arbitrary function and  and  form a solution of the equation | CO1 | **10** |
| b. | Show that the following partial differential equations and are compatible and hence find their solution. | CO1 | **10** |
| **(OR)** | | | | |
| 2. | a. | Find the characteristics of the equation and determine the integral surface which passes through the straight line , . | CO1 | **12** |
| b. | Derive the Charpit’s equations of a first order nonlinear partial differential equation  . | CO2 | **8** |
| 3. | a. | Reduce the Tricomi equation , for all to canonical form. | CO1 | **20** |
| **(OR)** | | | | |
| 4. | a. | Derive the canonical form for the second order parabolic partial differential equation. | CO1 | **10** |
|  | b. | Classify and transform the following equation to a canonical form. | CO1 | **10** |
| 5. | a. | Derive the solution of the Laplace equation in cylindrical coordinators using variable separable method. | CO3 | **20** |
| **(OR)** | | | | |
| 6. | a. | Derive the solution of the two dimensional Laplace equation in Cartesian form using variable seperable method. | CO3 | **10** |
|  | b. | Solve the Dirichlet’s problem for a rectangle. | CO3 | **10** |
| 7. | a. | The ends and of a rod , 10 cm in length are kept at temperature 00C and 1000C until the steady state condition prevails. Suddenly the temperature at the end is increased to 200C and the end is decreased to 600C . Find the temperature in the rod at time . | CO3 | **17** |
|  | b. | If is a continuously differentiable Dirac delta function vanishing for large , then Prove that . | CO3 | **3** |
| **(OR)** | | | | |
| 8. | a. | Derive the solution of Diffusion equation in cylindrical coordinates.  Also determine the temperature  in the infinite cylinder  when the initial temperature is , and the surface  is maintained at 00 temperature. | CO3 | **20** |
|  | | **Compulsory:** |  |  |
| 9. | a. | A string of length is released from rest in the position . Show that the total energy of the string is , where  and -tension in the string.  If the mid-point of a string is pulled aside through a small distance and then released, show that in the subsequent motion the fundamental mode contributes of the total energy. | CO4 | **20** |

ALL THE BEST

CO1 :Cauchy Method of Characteristics,

CO2 : Charpit’s Method,

CO3 : Separation of variables method,

CO4 : Method of Eigen Functions.