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– 2017**

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| **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. | Find the general integral of the following linear partial differential equation: | CO1 | 10 |
| b. | Derive the necessary and sufficient conditions for the two partial differential equations and to be compatible. | CO1 | 10 |
| (OR) | | | | |
| 2. | 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. | Find the complete integral of the partial differential equation using Charpit’s method. | CO2 | 10 |
|  |  |  |  |  |
| 3. | a. | Transform the following differential equation to a canonical form | CO1 | 10 |
|  | b. | Derive the canonical form for the second order parabolic partial differential equation. | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | Derive the canonical form of the second order linear partial differential equation | CO1 | 10 |
|  | b. | Classify and reduce the relation  to a canonical form and solve it. | CO1 | 10 |
|  |  |  |  |  |
| 5. | a. | Derive the one dimensional Laplace equation in Cartesian form using variable separable method. | CO1 | 10 |
|  | b. | Solve the Dirichlet’s problem for a rectangle. | CO1 | 10 |
| (OR) | | | | |
| 6. |  | A homogeneous thermally conducting cylinder occupies the region, , where  are cylindrical polar coordinates. The top  and the lateral surface  are held at 00, while the base is held at 1000. Assuming that there are no sources of heat generation within the cylinder, find the steady-temperature distribution within the cylinder. | CO3 | 20 |
|  |  |  |  |  |
| 7. | a. | Solve the one dimensional diffusion equation in the region , , subject to the conditions  (i) remains finite as  (ii) if and  for all  (iii) At , T= | CO3 | 10 |
|  | b. | Derive the solution of one dimensional diffusion equation in Cartesian form using separable method. | CO3 | 10 |
| (OR) | | | | |
| 8. |  | 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 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Find the solution of the wave equation under the following conditions:  (i)  (ii)  (iii) . | CO4 | 10 |
|  | b. | Derive the one-dimensional wave equation in Cartesian form. | CO4 | 10 |

ALL THE BEST