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

G:\logo and QP Template\logo 3 Feb 2018 final.tif

**End Semester Examination – Nov/Dec – 2018**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17PH3007** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MATHEMATICAL PHYSICS-II** | **Max. marks :** | **100** |

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | | | | | **Course**  **Outcome** | **Marks** |
| 1. | a. | Derive the necessary and sufficient conditions for f (z) to be an analytic function. | | | | | CO1 | 12 |
| b. | Show that the function is not regular at the origin although the Cauchy-Riemann equations are satisfied at that point. | | | | | CO1 | 5 |
| c. | State the Cauchy-Reimann condition for an analytic function. | | | | | CO1 | 3 |
| (OR) | | | | | | | | |
| 2. | a. | Prove by contour integration that . | | | | | CO1 | 12 |
| b. | Find the residue of . | | | | | CO1 | 5 |
| c. | State Cauchy’s residue theorem | | | | | CO1 | 3 |
|  |  |  | | | | |  |  |
| 3. | a. | Find the series of sines and cosines of multiples of x which represents f (x) in the interval –π < x < π. | | | | | CO2 | 12 |
| b. | Give the Fourier series involving phase angles. | | | | | CO2 | 5 |
| c. | Find a sine series for f(x) when 0 x π. | | | | | CO2 | 3 |
| (OR) | | | | | | | | |
| 4. | a. | Find a series of sines and cosines of multiples of x which will represent x + x2 in the interval –π < x < π. | | | | | CO2 | 12 |
| b. | Deduce the effective values and the average of a product using Fourier series. | | | | | CO2 | 5 |
| c. | Explain Dirichlet’s conditions briefly. | | | | | CO2 | 3 |
|  |  |  | | | | |  |  |
| 5. | a. | Arrive at the solution of one dimensional wave equation. | | | | | CO3 | 12 |
| b. | Derive an expression for one dimensional heat diffusion equation. | | | | | CO3 | 5 |
| c. | List any two properties of harmonic functions. | | | | | CO3 | 3 |
| (OR) | | | | | | | | |
| 6. | a. | Heat flows in a semi-infinite rectangular place, the end x=0 being kept at temperature Tº C and the edges y=a at temperature zero.Hence, show that the temperature at any point (x,y) is given by  . | | | | | CO3 | 12 |
| b. | Given an expression for the space form of the wave equation. | | | | | CO3 | 5 |
| c. | Write down the Maxwell’s electromagnetic field equations. | | | | | CO3 | 3 |
|  |  |  | | | | |  |  |
| 7. | a. | Show that the set of all nth roots of unity form a finite abelian group G of order n under ordinary multiplication as composition. | | | | | CO4 | 12 |
| b. | Show that in a group the inverse of the inverse is itself. | | | | | CO4 | 5 |
| c. | Define finite and infinite groups briefly. | | | | | CO4 | 3 |
| (OR) | | | | | | | | |
| 8. | a. | Show that for a finite group G, every representation is equivalent to a unitary representation. | | | | | CO4 | 12 |
| b. | If a matrix commutes with all the matrices of an irreducible representation, then show that it is a multiple of unit matrix. | | | | | CO4 | 5 |
| c. | Define a Hamiltonian group briefly. | | | | | CO4 | 3 |
|  | |  | | | | |  |  |
|  | | **Compulsory**: | | | | |  |  |
| 9. | a. | Using Lagrange’s interpolation formula, find the form of function f(x) from the following data. | | | | | CO5 | 12 |
|  | x | 3 | 2 | 1 | -1 |  |  |
| f (x) | 3 | 12 | 15 | -21 |
| b. | Using Simpson’s one-third rule, find the value of the integral correct to third decimal place. Take h=0.25. | | | | | CO5 | 5 |
| c. | Explain Piccard’s method briefly. | | | | | CO5 | 3 |