JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 (December 2017)
B.TECH : III SEM (CSE/IT/ECE)

COURSE CODE : 10B11MA201   MAXM. MARKS : 35
COURSE NAME : MATHEMATICS-II
COURSE CREDITS : 04   MAXM. TIME : 2 HOURS

NOTE : Attempt all questions. All questions carry equal marks.

1. Find the solution of the heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$, subject to the boundary conditions $u(0,t) = 0$, $u(L,t) = 0$ and initial condition $u(x,0) = x$.

2. Show that $J_{\frac{5}{2}}(x) = \sqrt{\frac{2}{\pi x}}\left[\frac{3-x^2}{x^2}\sin x - \frac{3}{x}\cos x\right]$.

3. Show that for the function $f(z) = \begin{cases} \frac{2xy(x+iy)}{x^2+y^2}, & z \neq 0 \\ 0, & z = 0 \end{cases}$, the CR-equations are satisfied at the origin but the derivative of $f(z)$ at the origin does not exist.

4. Find the Laurent series expansion of $f(z) = \frac{7z^2+9z-18}{z^3-9z}$ valid for $3 < |z-3| < 6$.

5. Evaluate $\int_0^{3+i} z^2 dz$ along (i) the line $y = \frac{x}{3}$ (ii) the line from $z = 0$ to $z = 3$ along x-axis followed by line parallel to y-axis from $z = 3$ to $z = 3+i$.

6. Evaluate the integral $\int_0^{2\pi} \frac{d\theta}{3+2\cos\theta}$.

7. Evaluate $\int_{-\infty}^{\infty} \frac{x^2-x+2}{(x^2+1)(x^2+9)} dx$.