POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name **Enrollment No.**

Jaypee Institute of Information Technology, Noida

End Term Examination, 2016
B.Tech II and IV Semester

Course Title: Mathematics-II **Maximum Time: 02 Hours**
Course Code: 15B11MA211/10B11MA201 **Maximum Marks: 35**

Note: Attempt all questions.

1. If $u-v=(x-y)(x^2+4xy+y^2)$, and $f(z)=u+iv$ is analytic function of $z=x+iy$, find $f(z)$ in terms of z. (3)

2. Find all possible Laurent's series of the function $f(z)=\dfrac{7z-2}{z^3-z^2-2z}$ about $z=-1$. (3)

3. Find the bilinear transformation which transforms the point $z=2, 1, 0$ into $w=1, 0, i$ respectively. Hence, find the invariant (fixed) points of the transformation. (3)

4. Using Cauchy's integral formula / theorem, evaluate $\oint_C \dfrac{e^{5z}}{z(z+\pi i)^2}dz$ where C is
   (i) $|z-3|=1$ (ii) square with vertices (-1,1), (1,1), (1,-1) and (-1,-1)
   (iii) $|z-1+\pi i|=3/2$. (4)

5. Evaluate $\int_0^\infty \dfrac{dx}{x^4+5x^2+4}$ by taking an appropriate contour using Cauchy's residue theorem. (4)

6. Test the convergence of the positive term series $\sum u_n$ where $u_n=\dfrac{2.4.6...2n}{5.8.11....(3n+2)}x^n$. (4)

7. Find one integral of complementary function (C.F.) and use it to find the general solution of the differential equation
   $$\sin x\frac{d^2y}{dx^2}-\cos x\frac{dy}{dx}-(\sin x-\cos x)y=e^x\sin^2 x.$$ (4)

8. A rectangular plate with insulated surface is 10 cm wide and so long compared to its width that it may be considered infinite in length without introducing an appreciable error. If the temperature along one short edge $y=0$ is given by $u(x,0)=\sin^3(\pi x/10)$, $0<x<10$, while the two long edges $x=0$ and $x=10$ as well as other short edge are kept at 0^0C then find out the steady state temperature at any point of the plate. (5)

9. Find the series solution of the following differential equation about $x=0$
   $$(x-x^2)y''+(1-5x)y'-4y=0.$$ (5)