KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food Engg.) 2011 Admission

IInd Semester Final Examination, July/August 2012

Cat.NoBasc.1205

Title: Engineering Mathematics II (3+0)

Marks: 80

Time: 3hours

I.a) Fill up the blanks for the following

1. If $\sum u_n$ is convergent then $\underset{n\to\infty}{Lt}\ u_n$ = ...

2. If $\underset{n\to\infty}{Lt}\ \dfrac{u_n}{u_{n+1}} = k$, then $\sum u_n$ converges if ....

3. If $f(D) = D^2 - 2$, then $\dfrac{1}{f(D)} e^{2x}$ = ...

b). Write down one dimensional wave equation

c) Match the following

A	B
5. Lagrange's Linear equation	I). $(ax+b)^2 \dfrac{d^2 y}{dx^2} + k_1 (ax+b)\dfrac{dy}{dx} + k_2 y = g(x)$
6. Bernoulli's differential equation	II). $y = px + f(p)$ where $p = \dfrac{dy}{dx}$
7. Legendre's linear equation	III). $P(x,y,z)\dfrac{\partial z}{\partial x} + Q(x,y,z)\dfrac{\partial z}{\partial y} = R(x,y,z)$
8. Clairaut's equation	IV). $\dfrac{dy}{dx} + P(x)y = Q(x)y^n$

d) Write *True or False* for the following

9. $u = x^2 - y^2$ is a solution of $u_{xx} + u_{yy} = 0$

10. $x = 0$ is a regular point of $\dfrac{d^2 y}{dx^2} + xy = 0$

(10 X 1 = 10)

PART B

(Answer any ten questions, each carries 3 marks)

II 1. Explain the conditionally convergence of a series

2. Explain Raabe's test

3. Test the convergence of the series $\sum \dfrac{1}{n}$

4. Discuss the convergence of the series $\sqrt{\dfrac{1}{2}} + \sqrt{\dfrac{2}{3}} + \sqrt{\dfrac{3}{4}} + \ldots\ldots$

5. Find the complementary function of $(D^2 - 6D + 8)y = e^{2x} \sin 4x$

6. Find the Particular integral of $(D^2 - 5D + 6)y = \sin x$

7. Solve the Clairaut's equation $p = \sin(y - xp)$

8. Show that $y\dfrac{dy}{dx} = x \sin x e^{-y}$ is exact

9. Solve $\dfrac{dy}{dx} = y$ by power series method

10. Define regular and singular point of a second order linear differential equation

11. Show that $u = e^x \sin y$ satisfy Laplace equation

12. Solve the p.d.e $\sqrt{p} + \sqrt{q} = 1$

(10 X 3 = 30)

PART C

(Answer any six questions, each carries 5 marks)

III 1. Test the convergence of the series $\displaystyle\sum_{n=0}^{\infty} \dfrac{n^3 + 1}{5^n + 1}$

2. Test the convergence of the series $\displaystyle\sum_{n=0}^{\infty} \dfrac{n^{n^2}}{(n+1)^{n^2}}$

3. Discuss the convergence of the series $x + \dfrac{2^2 x^2}{2!} + \dfrac{3^3 x^3}{3!} + \dfrac{4^4 x^4}{4!} + \ldots\ldots$

4. Solve $\dfrac{dy}{dx} = y \tan x - y^2 \sec x$

5. Solve $\dfrac{d^2 y}{dx^2} = y$ by power series method

6. Solve $(D^2 - 2D + 4)y = e^x \cos x$

7. Solve $x^2 y'' - xy' + y = \log x$

8. Solve $2z + p^2 + qy + 2y^2 = 0$ using char pit's method

(6 x 5=30)

IV 1.Derive one dimensional heat equation and find its general solution

2. Solve the Legendre's equation $(1-x^2)\dfrac{d^2y}{dx^2} - 2x\dfrac{dy}{dx} + n(n+1)y = 0$

$(1 \times 10 = 10)$