KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food .Engg) 2011 Admission

IInd Semester Special Re- Examination- June -2015

Cat. No: Basc.1205 **Marks: 80.00**

Title: Engineering Mathematics-II (3 +0) **Time: 3 hours**

I.

a) Fill up the blanks for the following

1. If $|x| < 1$, then the geometric series $1 + x + x^2 + \cdots$ converges and diverges if ....
2. If the series $u_1 + u_2 + u_3 + \cdots = \sum_{i=1}^{\infty} u_i$ converges then $\lim_{n\to\infty} u_n =$ ....
3. $\frac{1}{D^2 - 3D + 2} e^x =$ ....

b) Write down one dimensional wave equation

c) Match the following

A	B
5. Bernoulli's differential equation	1) $(ax+b)^2 \frac{d^2y}{dx^2} + K_1(ax+b)\frac{dy}{dx} + K_2 y = g(x)$
6. Clairaut's equation	2) $y' + P(x)y = Q(x)y^n$
7. Lagrange's linear equation	3) $y = P(x) + f(p)$ where $p = \frac{dy}{dx}$
8. Legendre's linear equation	4) $P(x,y,z)\frac{\partial z}{\partial x} + Q(x,y,z)\frac{\partial z}{\partial y} = R(x,y,z)$

d) Write *True* or *False* for the following

9. Wave equation $C^2 \frac{d^2u}{dx^2} = \frac{d^2u}{dt^2}$ is hyperbolic.
10. $x = 0$ is a regular point of $y'' + xy = 0$

[10 x 1 = 10 Marks]

[P.T.O]

PART B

(Answer any ***Ten*** questions, each carries **3** marks)

II)

1. Test the convergence of the series $\frac{1}{1.2}+\frac{1}{3.4}+\frac{1}{5.6}+\cdots$
2. Explain Raabe's test.
3. Explain Cauchy's root test and integral test.
4. Test for convergence or divergence of the series $\frac{1}{1+3}+\frac{2}{1+3^2}+\frac{3}{1+3^3}+\cdots$
5. Solve $(D^2+D-2)y=\sin x$
6. Find the particular integral of $(D^2-D-2)y=\sin 2x+e^x$
7. Show that one dimensional heat equation is parabolic.
8. Find $P_2(x)$ from $P_n(x)=\frac{1}{2^n n!}\frac{d^n}{dx^n}(x^2-1)^n$
9. Show that $(3x^2+6xy^2)dx+(6x^2y+4y^3)dy=0$ is exact.
10. Solve the Lagrange's linear equation $p\sqrt{x}+q\sqrt{y}=\sqrt{z}$
11. Solve $pq=p+q$
12. Show that $u=e^x\sin y$ satisfy Laplace's equation.

[10 x 3 = 30 Marks]

PART C

(Answer any ***Six*** questions, each carries **5** marks)

III)

1. Test for convergence or divergence the series $\frac{1}{1.3.5}+\frac{2}{3.5.7}+\frac{3}{5.7.9}+\cdots$.
2. Show that the series $\sum_{n=0}^{\infty}\frac{n^2+1}{5^n+1}$ converges
3. Test the convergence of the series $1+\left(\frac{1}{2}\right)^2+\left(\frac{1.3}{2.4}\right)^2+\left(\frac{1.3.5}{2.4.6}\right)^2+\cdots$
4. Solve $(2xy+y-\tan y)\,dx+(x^2-x\tan^2 y+\sec^2 y)dy=0$

5. Solve by the method of variation of parameters $\frac{d^2y}{dx^2} + y = x$
6. Solve $y'' + x^2y = 0$ by power series method
7. Solve $(D^2 - 3D + 2)y = 6e^{-3x} + \sin 2x$
8. Solve $2zx - px^2 - 2qxy + pq = 0$ using Charpit's method.

[6 x 5 = 30 Marks]

PART D

(Answer any **One** questions, each carries **10** marks)

1. Solve the Bessel's equation $x^2y'' + xy' + (x^2 - n^2)y = 0$
2. Derive one dimensional heat equation and find its general solution.

[1 x 10 = 10 Marks]