KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) 2012 Admission

IInd Semester Final Examination- July -2013

Cat. No: Basc.1205 **Marks: 80**

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

Part A

I.

a) Fill up the blanks for the following

1. If a $+ve$ term series $\sum_{n=1}^{\infty} u_n$ is convergent then $\lim_{n\to\infty} u_n =$ ....
2. The harmonic series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges for $p > 1$ and diverges for ....
3. $\frac{1}{f(D)} e^{ax} =$ .... when $f(a) \neq 0$

b) 4. Write down one dimensional heat equation

c) Match the following

A	B
5. Rodrigue's formula	1) $\sqrt{\frac{2}{\pi x}} \sin x$
6. Exact differential equation	2) $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$
7. $J_{1/2}(x)$	3) $Mdx + Ndy = 0$
8. Two dimensional Laplace's equation	4) $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} (x^2 - 1)^n$

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

9. An equation of the form $A\frac{\partial^2 u}{\partial x^2} + 2B\frac{\partial^2 u}{\partial x \partial y} + C\frac{\partial^2 u}{\partial y^2} = F(x, y, u_x, u_y)$ is said to be hyperbolic if $AC - B^2 < 0$
10. $z = ax + by + f(a, b)$ is the complete solution of equations of the form $z = px + qy + f(p, q)$

[10 x 1 = 10 Marks]

[P.T.O]

PART B

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

II)

1. Discuss the convergence of the series $\sum_{n=1}^{\infty}\left(\frac{1}{\sqrt{n}}-\frac{1}{\sqrt{n+1}}\right)$
2. Explain D' Alembert's ratio - test for convergence.
3. Explain the absolute convergence of a series.
4. Test the convergence of the series $\sum_{n=1}^{\infty}\frac{n!}{n^n}$
5. Solve $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+5y=\sin 3x$
6. Solve $x^2y\,dx-(x^3+y^3)dy=0$
7. Show that the Laplace's equation $\frac{\partial^2u}{\partial x^2}+\frac{\partial^2u}{\partial y^2}=0$ is elliptic.
8. Solve $\frac{dy}{dx}=y$ by power series method
9. Show that $(a^2-2xy-y^2)dx-(x+y)^2dy=0$ is exact.
10. Solve the Langrange's linear equation $y^2zp+x^2zq=xy^2$
11. Solve $\sqrt{p}+\sqrt{q}=1$
12. If $u=3x^2y+2x^2-y^3-2y^2$, show that $\frac{\partial^2u}{\partial x^2}+\frac{\partial^2u}{\partial y^2}=0$

[10 x 3 = 30 Marks]

PART C

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

III)

1. Test for convergence or divergence the series $\frac{1}{1.2.3}+\frac{1}{2.3.4}+\frac{1}{3.4.5}+\cdots$.
2. Test the convergence of $\sum_{n=1}^{\infty}\frac{\sqrt{n+1}-\sqrt{n-1}}{n^3}$
3. Test the convergence of the series $\left(\frac{2^2}{1^2}-\frac{2}{1}\right)^{-1}+\left(\frac{3^3}{2^3}-\frac{3}{2}\right)^{-2}+\left(\frac{4^4}{3^4}-\frac{4}{3}\right)^{-4}+\ \ldots..$
4. Solve $sec^2x\tan y\,dx+sec^2y\tan x\,dy=0$

5. Solve by the method of variation of parameters $\frac{d^2y}{dx^2} + 4y = 4\tan 2x$
6. Find the series solution in powers of x for the differential equation $y'' + xy = 0$
7. Solve $(D^2 - 4D + 4)y = e^{-4x} + 5\cos 3x$
8. Solve $2z + p^2 + qy + 2y^2 = 0$ using Charpit's method.

[6 x 5 = 30 Marks]

PART D

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

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

[1 x 10 = 10 Marks]