



Basc.2209

KERALA AGRICULTURAL UNIVERSITY
B.Tech. (Food Engg.)
One-Time Re-examination-January-2018
2014 Admission VII Semester
Engineering Mathematics –II (3+0)

Marks: 50
Time: 2 hours
(10x1=10)

I Fill in the Blanks

- 1 $\frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} + \dots$ converges for-----
- 2 The solution of ordinary differential equation $x dy + y dx = 0$ is-----
- 3 The value of $\frac{1}{f(D^2)} \sin ax$ is-----
- 4 $\frac{1}{D^2+5D+6} e^{5x} =$ -----

Match the Following

- | | |
|-------------------------------------|--|
| 5 Bernoulli's differential equation | a $f(x) = x^2 \frac{d^2y}{dx^2} + Ax \frac{dy}{dx} + By =$ |
| 6 Cauchy's differential equation | b $y = px + f(p)$ |
| 7 Legendre's linear equation | c $Q(x)y^n = \frac{dy}{dx} + P(x)y$ |
| 8 Clairaut's equation | d $f(x) = (ax + b)^2 \frac{d^2y}{dx^2} + A(ax + b) \frac{dy}{dx} + By$ |

State True or False

- 9 The series $1 + 2 + 3 + \dots + n + \dots$ is convergent
- 10 $x = 0$, is a regular point of $\frac{dy}{dx} + xy = 0$

II Answer any FIVE of the following

(5x2=10)

- 1 Solve $x \frac{dy}{dx} + y = x^3 y^6$
- 2 Solve $(1 + 2xy \cos x^2 - 2xy)dx + (\sin x^2 - x^2)dy = 0$
- 3 Solve $(D^2 + 5D + 6)y = e^x$
- 4 Derive a partial differential equation $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$
- 5 Solve $p^2 + q^2 = x + y$
- 6 Test the convergence of $\sum \frac{n^3}{3^n}$
- 7 Find $P_2(x)$, from $\frac{1}{2^n n!} \frac{d^n}{dx^n} (x^2 - 1)^n$

III Answer any FIVE of the following.

(5x4=20)

- 1 A string is stretched and fastened to two points, L apart. Motion is started by displacing the string in the form $y = a \sin \frac{\pi x}{L}$ from which it is released at time $t = 0$. Show that the displacement of any point at a distance x from one end at time t is given by
$$y = a \sin \frac{\pi x}{L} \cos \frac{\pi ct}{L}$$
- 2 With boundary conditions $u(x, 0) = 3\pi x$; $u(0, t) = 0$ and $u(1, t) = 0$, where $0 < x < 1$, $t > 0$, Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$
- 3 Solve $\frac{\partial^2 z}{\partial x^2} - 7 \frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = e^{(x-y)}$
- 4 Form a partial differential equation, by eliminating arbitrary constant of the equation $x^2 + y^2 + (z - c)^2 = r^2$
- 5 Solve $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + y = \log x$
- 6 By the method of variation of parameters, solve $\frac{d^2 y}{dx^2} + 4y = \tan 2x$
- 7 Test the convergence of the series $\frac{1}{3} + \frac{1.2}{3.5} + \frac{1.2.3}{3.4.7} + \dots \dots \dots$

IV Answer any ONE of the following

(1x10=10)

- 1 Derive one dimensional wave equation.
- 2 Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6 \frac{\partial^2 z}{\partial y^2} = \cos(2x + y)$
