



KERALA AGRICULTURAL UNIVERSITY  
B.Tech.(Food Engg) 2017 Admission  
II Semester Final Examination-July 2018

Basc. 1205

Engineering Mathematics II (3+0)

Marks: 50  
Time: 2 hours

I Answer the following

(10x1=10)

- 1 Discuss the nature of the series  $\frac{1}{4} + \frac{3}{7} + \frac{5}{10} + \dots$
- 2 State Raabe's test.
- 3  $\left[ y \left( 1 + \frac{1}{x} \right) + \cos y \right] dx + [x + \log x - x \sin y] dy = 0$  is an example of ..... differential equation.
- 4 Solve  $\frac{d^3y}{dx^3} + y = 0$ .
- 5 Find the particular solution for the differential equation  $(D^2 + 5D + 6)y = 4^x$ .
- 6 Find  $A'$  for the differential equation  $y'' + a^2y = \sec(ax)$ , by using the method of variation of parameters.
- 7 Obtain the complementary function for the differential equation  $x^2y'' + xy' + 9y = 3x^2 + \sin(3 \log x)$ .
- 8 Form the partial differential equation from the function  $z = f(x^2 + y^2)$ .
- 9 Solve  $zxp + yzq = xy$ .
- 10 State the formula to solve the equation of the form  $f(x, y, z, p, q)$  using Charpit's method.

II Write Short notes on any FIVE of the following

(5x2=10)

- 1 Show that  $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \sin x$ .
- 2 Solve  $[D^4 - 18D^2 + 81]y = 36 e^{3x}$ .
- 3 Find the nature of the series  $\frac{1}{\sqrt{2}} + \frac{2}{\sqrt{9}} + \frac{3}{\sqrt{28}} + \frac{4}{\sqrt{68}} + \dots$
- 4 Form a partial differential equation for the function  $z = f(x + ay) + g(x - ay)$ , by the method of elimination of arbitrary functions.
- 5 Solve  $x^2 \frac{\partial z}{\partial x} + y^2 \frac{\partial z}{\partial y} = (x + y)z$ .
- 6 Solve  $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 2y = 4 \cos^2 x$ .
- 7 Solve  $[2 + 2x^2\sqrt{y}]y dx + [x^2\sqrt{y} + 2]x dy = 0$ .

P.T.O

III

Answer any FIVE of the following.

(5x4=20)

- 1 a. Discuss the convergence of  $\frac{1^2}{4^2} + \frac{1^2.5^2}{4^2.8^2} + \frac{1^2.5^2.9^2}{4^2.8^2.12^2} + \dots$
- b. Using Cauchy's root test, discuss the convergence of the series  $\sum_{n=1}^{\infty} \frac{(n+1)^n}{n^{n+1}} \cdot X^n$
- 2 a. Solve  $(xy + 2x^2y^2)dx + x(xy - x^2y^2)dy = 0$ .
- b. Solve  $xy(1 + xy^2) \frac{dy}{dx} = 1$ .
- 3 Solve the following
  - a.  $\frac{d^2y}{dt^2} - 4 \frac{dy}{dt} + 13y = e^{3t} \cosh 2t + 2^t$
  - b.  $[D^3 + 6D^2 + 11D + 6] y = 0$
- 4 Solve for p, if  $p^2 + 2py \cot x = y^2$
- 5 Solve  $\frac{dy}{dx} + y = z + e^x$ .
- 6 Solve  $x^4 \frac{d^3y}{dx^3} + 2x^3 \frac{d^2y}{dx^2} - x^2 \frac{dy}{dx} + xy = \sin(\log x)$ .
- 7 a. Solve  $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$ .
- b. Solve  $p^2 + pqy = z$  by Charpit's method.

IV

Write an essay on any ONE of the following

(1x10=)

- 1 a. Solve by the method of variation of parameters  $(D^2 - 3D + 2)y = \cos(e^{-x})$
- b. Find the complete integral of  $pxy + pq + qy = yz$  by Charpit's method.
- c. Solve  $zxp + yzq = xy$ .
- 2 a. Solve  $[1 + e^{x/y}]dx + e^{1/y} [1 - \frac{x}{y}] dy = 0$ .
- b. Solve  $y'' + 4y' - 12y = e^{2x} - 3 \sin 2x$ .
- c. Discuss the convergence of the series  $\frac{p}{q} + \frac{p(p+a)}{q(q+b)} + \frac{p(p+a)(p+2a)}{q(q+b)(q+2b)} + \dots$

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