USN

14MAT21

Second Semester B.E. Degree Examination, June/July 2015

Engineering Mathematics - II

Time: 3 hrs. Max. MarlreVd0

Note: *Answer any FIVE full questions, selecting ONE full question from f 4..,91Part.*

PART — A

1 a. **Solve** $4\frac{d^4 y}{dx^4} - 4\frac{d^3 u}{dx^3} - 23\frac{d^2 u}{dx^2} + 12\frac{du}{dx} + 36y = 0.$ (06 Marks)

b. **Solve** $\frac{d^3y}{dx^3} + 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} + 6y = e^x + 1$ using inverse diffeNntiff operator method. (07 Marks)

c. **Solve** $(D^2 - 2D)y$ -- e^x sinx using method of undete coe dents. (07 Marks)

2 a. **Solve** $(4D^4 - 8D^3 - 7D^2 + 11D + 6)y = 0.$ r)''' li Ask % Marks)

b. **Solve** $(D^2 + 4.)y - x^2 + e'$ using inverse differk4tfal operator method. (07 Marks)

c. Solve $(1D^2 - 2D + .2)y = e^x \tan x$ using method of variation of parameters. (07 Marks)

PRT — B

3 a. **Solve** $\frac{dx}{dt} - 7x + y = 0,\ \frac{dy}{dt} - 5y = 0$. (06 Marks)

b. aive $x\frac{d^2y}{dx^2} + 4x\frac{dy}{d}$ ..,..1 S.) e^x . (07 Marks)

c. Solve y — 2px +.' p by solving for x. (07 Marks)

4 a. **Solve** $(1,4^1 x)2\frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = 2\sin(\log(1 + x))$. (06 Marks)

e $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$ by solving for P. (07 Marks)

te Solve (px — y) (py + x) = a^2p by reducing to Clairaut's form. (07 Marks)

PART — C

5 a. **From the function** $f(x^2 + y^2, z - xy) = 0$ form the partial differential equation. (06 Marks)

b. Derive one dimensional wave equation as $\frac{,9^{2}1.1}{at2} = 2\,7^{2}11\ \frac{E}{aX}$ (07 Marks)

c. Evaluate $\overset{I\ 2-x}{\underset{x^2}{f}}$ xydydx by changing the order of integration. (07 Marks)

6 a. Solve $\frac{a2u}{\&ay}$ = sinxsiny for which —$\frac{a1.1}{ay}$—2siny when x — 0 and u = 0 when y is an odd multiple of $\frac{—}{2}$. (06 Marks)

b. Derive one dimensional heat equation as $\frac{a_u}{at} = c^2 \frac{02_{u.}}{ax_2}$. ^{1}O$_{mi}$ (07 Marks)

c. Evaluate $\int_{-I}^{1} \int_{0}^{a\,xi-.} J_{x-z}$ (x + y + z)dyclxdz (07 Marks)

PART —D

7 a. Find the area between the parabolas? = 4ax and x^2 = 4ay using do teg;ral. (06 Marks)

b. Evaluate $\frac{dx}{\quad}$ using beta and gamma functions. Or Marks)
0

c. Express the vector Zi — 2xj + yk in cylindrical coordinates. (07 Marks)

8 a. Find the volume of the solid bounded by the planes x — 0, y = 0, x + y + z = 1 and z = 0 using triple integral. S V I% 1 I V II4' W (06 Marks)

b. Evaluate $\int_0^{n/2}$ .Ni n 9 de x 1^{-02} $\frac{d8}{0\ Vsin0}$ us' , \ beta and gamma functions. (07 Marks)

c. Express the vector field 2yi — zj in spherical polar coordinate system. (07 Marks)

1 , 4 66 0 1 c PART —E

Vi I i . Find the Laplace trans eQZN)fte $^{-4t}$ sin3t and $\frac{e^{at} - e^{-at}}{t}$ (06 Marks)

b. Express f(t) in to , unit step function and find its Laplace transform given that

t^2, 0 itiZ2
f(t) 4t,$_L$re)< t < 4 . (07 Marks)
114 t > 4

C. {(1) ^{2} 9) $\frac{1}{}$ using convolution theorem. (07 Marks)

10-k, a. A periodic function f(t) with period 2 is defined by f(t) t, 0<t<1 2 —t, 1<t <2 find L{ fW} . (06 Marks)

b. Find L^{-1} { $\frac{5s — 2}{3s^2 + 4s + 8}$ + o |)1, (07 Marks)

c. Solve using Laplace transform method $\frac{d2y}{dt}$—T + 2 $\frac{dy}{dt}$ + y = te with y(0) = 1, y^1(0) = -2. (07 Marks)