Time: 3 Hours

B.Tech. II Semester (Main) Exam 2022

**2FY2-01** Engineering Mathematics**-**II

**2E3201**

Maximum Marks: 70

Part-A (All Ten Questions)

Q.1 Let v1, v2 and *v3* be the first, second and third column vectors, respectively, of

the matrix

2 1 7

*A*

=

1 0 2

-1 5 13

―

What can we conclude about rank(A) from the observation 2v1 +3v2 − V3 = 0?.

Q.2 Suppose the system *AX* = *B* is consistent and *A* is a 5 × 8 matrix and rank(A)

3. How many parameters does the solution of the system have ?.

=

Q.3 State Cayley-Hamilton Theorem.

Q.4 Write the non-linear first order Bernoulli equation.

Q.5 Define Exact first order differential equation.

Q.6 Write the Euler-Cauchy differential equation.

Q.7 Write Clairaut's type differential equation.

Q.8 Write Bessel's differential eqiation.

Q.9 Write the Charpit's equations for the first order partial differential equation

*f*(*x*, y, z, p, q) = 0.

Q.10 Classify the partial differential equation

*22u* a2u *22u* +3- +

*მე*:2 *дхду ду2*

Part-B (All Five Questions)

Q.1 Find the values of A for which the equations

(λ − 1)x + (3λ + 1)y *+* 2λz

(X − 1)x + (4λ − 2)*y* + (X + 3)z

*2x* + (3λ + 1)y + 3(A − 1)z

0

=

0

**=**

0

-0.

10 x **2** = **20**

are consistent.

Q.2 Solve the differential equation

(*2y3xe3* + y2 + y)dx + *(y3x2e3 — xy −* 2x*)dy* = 0.

Q.3 Solve: *y = 2px + yp2*; where *p*

=

*dy dx*

Q.4 Solve: (*D2* – 4D+13)y = 18e2 sin 3x; where *D* =

*d*

*dx*

Q.5 Find the general solution of the partial differential equation

—

(3 − *2yz)p*+ x(2z − 1)q -- 2x *(y −* 3); where *p*

–

**Part-**C **(Any** Three Questions)

Q.1 Examine whether the matrix

-2 2

-3

A

2

1 -6

-1

-2

-2 0

*Əz*

*θα*

=

*q*

*Əx*

*ду*

5 X 4 = **20**

is diagonalizable. If so, obtain the matrix P such that *P*-*1AP* is a diagonal

matrix.

Q.2 Find the general solution of the differential equation

*d*

(*D2* + *4D* + 4)y *= = e*−2o sin x, D =

***-2x***

*dx*

using the method of variation of parameters.

Q.3 Find the power series solution of (1

―

x2) dx2

*d2y*

*dy* 2x

+*2y*= 0 about x =

= 0.

*dx*

Q.4 Find the complete integral of the partial differential equation

*2*

p2q2=*9p2y2(x2*+ *y2*)*-9x2y2.*

*a2z*

*θα θα*

Q.5 Solve the following equation

*მე:2*

2- + =

მე *მყ*

0 by the method of separation

of variables.

**3** x 10 = **30**