CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATION

RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE GENERAL, BACHELOR OF SCIENCE ECONOMICS STATISTICS, BACHELOR OF EDUCATION (SCIENCE) & BACHELOR OF EDUCATION(ARTS)

MATH 326: METHODS OF APPLIED MATHEMATICS

STREAMS: AS ABOVE **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 05/05/2021 **8.30 A.M - 10.30 P.M.**

INSTRUCTIONS

- **Answer ALL questions**
- **Adhere to the instructions on the answer booklet.**

QUESTION ONE (30 MARKS)

a. Identify the nature of the singular points of the equation $(1-x^2)y''-2xy'+2y=0$ (6 marks)

b. Find the recurrence relation satisfied by coefficients in the series solution of the differential equation $y''+2xy'+(1+x^2)y=0$ (6 marks)

c. Obtain the indicial equation of the following differential equations

$$2xy''+(x+1)y'+y=0$$ (6 marks)

d. Express in terms of legendres polynomials x^3+1 (6 marks)

e. Solve the differential equation $2xU_{xx}-3yU_{yy}=0$ by variable separable method 6marks

QUESTION TWO (20 MARKS)

a. Solve in series the differential equation $(1-x^2)y''-2xy'+2y=0$ (10 marks)

b. Find a Fourier series to represent $f(x)=\begin{cases}-1, & -\pi < x < 0\\ 1, & 0 < x < \pi\end{cases}$ (10 marks)

QUESTION THREE (20 MARKS)

a. Find the Laplace transform of t^3e^{-2t} (7 marks)

b. Using the Laplace transforms, to evaluate $\int_0^\infty t^2e^{-3t}\sin t\,dt$ (7 marks)

c. Express $f(x)=x$ as a sine series in $0<x<\pi$ (6 marks)

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