Code No.

Symbol Number: _____ Invigilator's Sign: _____ Superintendent's Sign: _____

Symbol No. in Words: _____

Faculty: Engineering **Level: Bachelor** **Year/Part: II/II**

Program: Electrical and Electronics **Subject: Applied Mathematics (EG552SH)**

GROUP A (Multiple Choice Questions) **[10x1=10]**

i. Answers should be given by filling the Objective Answer Sheet.

ii. Rough can be done in the main answer sheet

iii. Maximum time of 20 minutes within the total time is given for this group.

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1. If f(z) = u + iv is analytic and if u and v satisfying the Laplace equation, then u and v are called

   (a) Singularity (b) harmonic function

   (c) Analyte function (d) None

2. What is the extension of Cauchy 's Internal formula ?

   a. $\int_c \frac{f(z)}{(z-a)^{b+1}} dz = \frac{2\pi i f^n(a)}{n!}$

   b. $\int_c \frac{f(z)}{Z-a} dz = 2\pi i\, f(a)$

   c. $\int_c f(z)dz = 0$

   d. None of them.

3. If $f(z) = \frac{z^2}{(z-1)^2(z+2)}$,then Res f (-2) is equal to

   (a) $\frac{5}{9}$ (b) $\frac{4}{9}$ (c) $\frac{1}{9}$ (d) $-\frac{4}{9}$

4. If $x(k) = a^k$,for k≥ o ,then find z [x(k)] is

   (a) $\frac{z}{z-1}$ (b) $\frac{a}{z-a}$ (c) $-\frac{z}{z-a}$ (d) None

5. If k is a constant z{k} is

   (a) $\frac{z}{z-1}$ (b) $\frac{z}{z-k}$ (c) $\frac{k}{z-k}$ (d) $\frac{kz}{z+1}$

6. Given PDE $\frac{\partial u}{\partial t^2} = \frac{c^2 d^2u}{dx^2}$ is called

   (a) Wave equation (b) Heat equation

   © Laplace equation (d) None of above

7. $\frac{d^2u}{dt^2} = \frac{c^2 d^2u}{dx^2}$ reperesents the equation for

   (a) Vibration of a stretched string

   (b) Heat flow of a their rad

   (c) Motion of a projectile in a gravitation field

   (d) Oscillation of a simple pendulum

Multiple Choice Questions' Answer Sheet

Code No. _____ Marks Secured: _____

In Words: _____

Examiner's Sign: _____ Date: _____

Scrutinizer's Marks: _____

In Words: _____

Scrutinizer's Sign: _____ Date: _____

Corrected Fill Ⓐ ● Ⓒ Ⓓ

Incorrected Fill ~~Ⓐ~~ Ⓑ ● ✓Ⓓ

1.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	6.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
2.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	7.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
3.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
4.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
5.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

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8. Given $\frac{d^2u}{dt^2} = \frac{c^2}{dx^2}\frac{d^2u}{dx^2}$ subject to (i) u is not infinite for t ∞ (ii) $\frac{du}{dx} = 0$ for x=0 and x=l (iii) $u = lx - x^2$ for t=o between x=0 and x=l, then general solution is

a. $u = \frac{l^2}{b} - \frac{2l^2}{\pi^2}\sum_{n=1}^{\infty}\left[\frac{(-1)^n+1}{n^2}\right]\frac{\sin n\,\pi x}{l}e^{-\frac{n^2\pi^2c^2}{l^2}t}$

b. $u = \frac{l^2}{b} - \frac{2l^2}{\pi^2}\sum_{n=1}^{\infty}\left[\frac{(-1)^n+1}{n^2}\right]\frac{\cos n\,\pi x}{l}e^{-\frac{n^2\pi^2c^2}{l^2}t}$

c. $u = \frac{l^2}{b} + \frac{2l^2}{\pi^2}\sum_{n=1}^{\infty}\left[\frac{(-1)^n+1}{n^2}\right]\frac{\sin n\,\pi x}{l}e^{-\frac{n^2\pi^2c^2}{l^2}t}$

d. None of the above

9. The Fourier sine integrate of f(x) is

a. $\int_0^{\infty} A(\omega)cos\omega x d\omega$ b. $\int_0^{\infty} B(\omega)sin\omega x d\omega$

c. $\int_{-\infty}^{\infty} A(\omega)cos\omega x d\omega$ d. $\int_{-\infty}^{\infty} B(\omega)sin\omega x d\omega$

10. If f(x) is even, then Fourier transform of f(x) is

(a) Fourier cosine transform

(b) Fourier sine transform

© Inverse Fourier Cosine transform

(d) Inverse Fourier sine transform

Multiple Choice Questions' Answer Sheet

Code No. _____ Marks Secured: _____

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1.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	6.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
2.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	7.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
3.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
4.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
5.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

MANMOHAN TECHNICAL UNIVERSITY
Office of the Controller of Examinations
Budiganga- 4, Morang, Koshi Province, Nepal

Faculty: Engineering **Year/Part: II/II**

Program: Electrical and Electronics **Level: Bachelor** **F.M.: 50**

Subject: Applied Mathematics (EG552SH) **Time: 3 Hours** **P.M.: 20**

- ✓ *Group A contains Multiple Choice Questions of 10 marks.*
- ✓ *Candidates are required to give their answers in their own words as far as practicable.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary*.

Short answer questions. Attempt any EIGHT from nine questions. (8×2=16)

10. (a) Find real and imaginary part of log z.

(b) Show that μ=e^{-x} (x siny – y cos y) is hormonic function.

11. (a) find the linear transformation that maps.

$z_{1=-2,}$ $z_{2=0,}$ $z_{3=2,}$ into points $w_{1=0,}$ $w_{2=i,}$ $w_{3=-i,}$

(b) Find the z-transform of cosat.

12. (a) State the wave equation and give various solution of it?

(b) State any two laws which are assumed to derive one dimensional heat question.

13. (a) Derive the Fourier cosine transform of function.

(b) Find the Fourier cosine integral of f(x)= 1 for o < x < 1

0 for x > 1

Long answer questions. Attempt all the questions. (6×4=24)

14. Distinguish between Cauchy integral theorem and Cauchy integral formula using Cauchy integral formula, evaluate

$\int_c \frac{e^z}{(z-1)(z-2)} dz$, where c is a circle $|z|=3$ 1+3=4

15. Define an analytic function of complex variable. Derive Cauchy Riemann equation in Cartesian form. 1+3=4

16. Define z transform. Obtain Z transform of $t^2\, a^t$. 1+3=4

17. Solve equation $\frac{\partial u}{\partial t^2} = \frac{c^2}{} \frac{d^2u}{dx^2}$ with boundary and initial condition 4

u(o,t) =0, u(,t) =0, and u(x, 0) $= \frac{3sin\pi x}{l}$

18. If $\frac{d^2u}{dx^2} + \frac{d^2u}{dy^2} = 0$ satisfies the conditions 4

(1) u(∞,y) =0 for all y

(2) u(0,y) = 2 cos y , then show that u (x,y)= $2e^{-x}cosy$

19. state and prove convolution theorem for Fourier transforms. 1+3=4

The End