SLR-BD-11

Seat No.	

Set P

F.Y (B. Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2025

Engineering Mathematics – II

(BTCE0203 / BTME0203 / BTETE0203 / BTCSE0203 / BTEE0203 / BTECE0203)

Day & Date: Friday, 06-June-2025 Max. Marks: 70

Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in Answer Book Page no 03 (Starting page of the Answer Book). Each question carries one mark.

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.

3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks:14

Q.1 Choose the correct alternatives from the options. **14**

1) The differential equation $\frac{dy}{dx} = \frac{a_1x+b_1y+c_1}{a_2x+b_2y+c_2}$ will be exact if ______.

a) $b_2 = -a_1$ b) $a_2 = -b_1$

c) $b_1 = a_2$ d) $a_1 = b_2$

2) The orthogonal trajectories of family of curve $xy = a$ is ______.

a) $x^2 + y^2 = c$ b) $y^2 = 4ax$

c) $x = cy$ d) $y^2 - x^2 = c$

3) The factorial series $\sum \frac{1}{n!}$ is ______.

a) Convergent b) Divergent

c) Oscillatory d) Absolutely convergent

4) The p –series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is convergent if _____.

a) $p \leq 1$ b) $p = 0$

c) $p > 1$ d) $p = \frac{1}{2}$

5) Analytic function is also called as ______.

a) Holomorphic b) Irregular

c) Harmonic d) Laplace

6) $\cos(x + iy) =$ _______.

a) $\cos x \cos y + \sin x \sin y$ b) $\cos x \cos hy + i \sin x \sin hy$

c) $\cos x \cos hy - i \sin x \sin hy$ d) $\cos hx \sin hy - i \sin hx \sin hy$

7) $[\cos\theta - i\sin\theta]^4 =$ _____

a) $\sin 4\theta - i\ \cos 4\theta$ b) $\cos 4\theta + i\ \sin 4\theta$
c) $\cos 4\theta - i\ \sin 4\theta$ d) $\sin 4\theta + i\ \cos 4\theta$

8) $\frac{B(m+1,n)}{B(m,n)}$ is equal to _____.

a) $\frac{m}{n}$ b) $\frac{m+1}{n}$
c) $\frac{m-1}{n}$ d) $\frac{m}{m+n}$

9) Which of the following is not true?

a) $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$ b) $\Gamma\left(\frac{1}{4}\right)\Gamma\left(\frac{3}{4}\right) = \sqrt{2}\pi$
c) $\Gamma(n+1) = n\,\Gamma(n)$ d) $\Gamma(-2) = \infty$

10) The numbers of loops of $r = a\sin 2\theta$ are _____.

a) Two b) Three
c) Four d) eight

11) For the curve $y^2(2a - x) = x^3$, the origin is _____.

a) Node b) Cusp
c) Isolated point d) None of these

12) The value of $\int_0^{\pi/2}\int_0^{\pi/2}\sin(x+y)dx\,dy$ is ______.

a) 0 b) 2
c) π d) -2

13) For $\int_0^{\infty}\int_x^{\infty} f(x,y)\,dydx$ by the change of order of integration, we get ______.

a) $\int_0^{\infty}\int_0^{x} f(x,y)\,dxdy$ b) $\int_x^{\infty}\int_0^{\infty} f(x,y)\,dxdy$
c) $\int_0^{\infty}\int_y^{\infty} f(x,y)\,dxdy$ d) $\int_0^{\infty}\int_0^{y} f(x,y)\,dxdy$

14) If density ρ (rho) at any point varies as the distance of the point from $y-$ axis then ρ equals to _____.

a) kx b) kxy
c) ky d) $k(x^2 + y^2)$

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Set P

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Day & Date: Friday, 06-June-2025 Max. Marks: 56
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
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3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any three of the following questions. **09**

a) Solve: $(2x-2y+5)dy=(x-y+3)dx$

b) Solve $y(1+xy)dx-x(1-xy)dy=0$

c) Find the analytic function whose real part is $e^x\cos y$

d) Find all the values of $x^4+x^3+x^2+x+1=0$

e) Test the convergence of $\frac{3}{4}+\left(\frac{4}{5}\right)^2+\left(\frac{5}{6}\right)^3+\cdots+\left(\frac{n+2}{n+3}\right)^n+\cdots$ by using Cauchy n^{th} root test.

Q.3 Solve any three of the following questions. **09**

a) Solve: $\frac{dy}{dx}+\frac{2x}{x^2+1}y=\frac{4x^2}{x^2+1}$

b) Find the orthogonal trajectory of family of cardioids $r=a(1+\cos\theta)$

c) Check whether following function is analytic or not. If analytic then find its derivatives. $f(z)=z^2+\bar{z}$

d) Find k such that $f(z)=\frac{1}{2}\log(x^2+y^2)+i\tan^{-1}\frac{ky}{x}$ is analytic.

e) Test the convergence of $\sum\frac{3^n}{2^{n+3}}$

Q.4 Solve any two of the following questions. **10**

a) The charge q on the plate of the condenser of capacity C, charged through a resistance R by a steady voltage V satisfies the differential equation
$R\frac{dq}{dt}+\frac{q}{C}=V$. And $q=0$ when $t=0$. Show that $q=C.V.(1-e^{-t/CR})$

b) Define absolute and conditional convergence. Examine the convergence of the series, $\sum\frac{(-1)^n(n^2+1)}{n^3}$

c) Show that $u=\cos x\cosh y$ is a harmonic function. Find its harmonic conjugate and corresponding harmonic function.

Section – II

Q.5 Solve any three of the following questions. **09**

a) Evaluate $\int_0^\infty x^4 e^{-x^6} dx$

b) Evaluate by using DUIS rule: $\int_0^\infty \frac{e^{-x}(1-\cos ax)}{x} dx$

c) Trace the following curves with full justification $r = a\,(1 - \cos\theta\,)$

d) Change to polar co-ordinate system and evaluate
$$\int_0^a \int_y^a \frac{x\,dxdy}{(x^2+y^2)}$$

e) Find the area by double integration common of the circles $r = a$ and $r = 2\,\alpha\cos\theta$

Q.6 Solve any three of the following questions. **09**

a) Evaluate $\int_0^3 x^3\,(3-x)^4 dx$

b) Trace the curve $x = a(t - \sin t), y = a(1 + \cos t)$

c) Evaluate $\int_0^2 \int_1^2 \int_0^{yz} xyz\;dx\;dy\;dz$

d) Evaluate $\int\int e^{3x+4y} dxdy$ over the triangle $x = 0, y = 0, x + y = 1$

e) Find by double integration the mass of a thin plate bounded by $y^2 = x$ and $x^2 = y$. If the density at any point varies as the square of its distance from the origin.

Q.7 Solve any two of the following questions. **10**

a) State and Prove Duplication Formula.

b) Trace the following curves with full justification $xy^2 = a^2(a - x)$

c) Change the order of integration and evaluate $\int_0^\infty \int_0^x e^{\frac{-x^2}{y}} x\;dx\;dy$

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Set Q

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks:14

Q.1 Choose the correct alternatives from the options. **14**

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2) Which of the following is not true?

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3) The numbers of loops of $r = a\sin 2\theta$ are _____.

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a) $\int_0^\infty \int_0^x f(x,y)\, dxdy$ b) $\int_x^\infty \int_0^\infty f(x,y)\, dxdy$
c) $\int_0^\infty \int_y^\infty f(x,y)\, dxdy$ d) $\int_0^\infty \int_0^y f(x,y)\, dxdy$

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Set Q

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Section – I

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Q.3 Solve any three of the following questions. **09**

a) Solve: $\frac{dy}{dx}+\frac{2x}{x^2+1}y=\frac{4x^2}{x^2+1}$

b) Find the orthogonal trajectory of family of cardioids $r=a(1+\cos\theta)$

c) Check whether following function is analytic or not. If analytic then find its derivatives. $f(z)=z^2+\bar{z}$

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Section – II

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Set R

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks:14

Q.1 Choose the correct alternatives from the options. 14

1) For the curve $y^2(2a-x)=x^3$, the origin is _____.
a) Node b) Cusp
c) Isolated point d) None of these

2) The value of $\int_0^{\pi/2}\int_0^{\pi/2}\sin(x+y)dx\,dy$ is ______.
a) 0 b) 2
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3) For $\int_0^{\infty}\int_x^{\infty} f(x,y)\,dydx$ by the change of order of integration, we get ______.
a) $\int_0^{\infty}\int_0^{x} f(x,y)\,dxdy$ b) $\int_x^{\infty}\int_0^{\infty} f(x,y)\,dxdy$
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c) $b_1=a_2$ d) $a_1=b_2$

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9) Analytic function is also called as _____.
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10) $\cos(x + iy) =$ ______.
a) $\cos x \cos y + \sin x \sin y$
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11) $[\cos\theta - i\sin\theta]^4 =$ _____
a) $\sin 4\theta - i\ \cos 4\theta$
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b) Three
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Set R

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Section – I

Q.2 Solve any three of the following questions. **09**

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e) Test the convergence of $\frac{3}{4} + \left(\frac{4}{5}\right)^2 + \left(\frac{5}{6}\right)^3 + \cdots + \left(\frac{n+2}{n+3}\right)^n + \cdots$ by using Cauchy n^{th} root test.

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b) Define absolute and conditional convergence. Examine the convergence of the series, $\sum \frac{(-1)^n(n^2+1)}{n^3}$

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Section – II

Q.5 Solve any three of the following questions. **09**

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a) Evaluate $\int_0^{3} x^3\,(3-x)^4 dx$

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Set S

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MCQ/Objective Type Questions

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Q.1 Choose the correct alternatives from the options. **14**

1) $\cos(x+iy) =$ _______.
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a) kx b) kxy
c) ky d) $k(x^2+y^2)$

10) The differential equation $\frac{dy}{dx}=\frac{a_1x+b_1y+c_1}{a_2x+b_2y+c_2}$ will be exact if _____.

a) $b_2=-a_1$ b) $a_2=-b_1$
c) $b_1=a_2$ d) $a_1=b_2$

11) The orthogonal trajectories of family of curve $xy=a$ is _____.

a) $x^2+y^2=c$ b) $y^2=4ax$
c) $x=cy$ d) $y^2-x^2=c$

12) The factorial series $\sum\frac{1}{n!}$ is _____.

a) Convergent b) Divergent
c) Oscillatory d) Absolutely convergent

13) The p –series $\sum_{n=1}^{\infty}\frac{1}{n^p}$ is convergent if ____.

a) $p\le 1$ b) $p=0$
c) $p>1$ d) $p=\frac{1}{2}$

14) Analytic function is also called as _____.

a) Holomorphic b) Irregular
c) Harmonic d) Laplace

SLR-BD-11

Seat No.	

Set S

F.Y (B. Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2025
Engineering Mathematics – II
(BTCE0203 / BTME0203 / BTETE0203 / BTCSE0203 / BTEE0203 / BTECE0203)

Day & Date: Friday, 06-June-2025 Max. Marks: 56
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any three of the following questions. **09**

a) Solve: $(2x-2y+5)dy=(x-y+3)dx$

b) Solve $y(1+xy)dx-x(1-xy)dy=0$

c) Find the analytic function whose real part is $e^x\cos y$

d) Find all the values of $x^4+x^3+x^2+x+1=0$

e) Test the convergence of $\frac{3}{4}+\left(\frac{4}{5}\right)^2+\left(\frac{5}{6}\right)^3+\cdots+\left(\frac{n+2}{n+3}\right)^n+\cdots$ by using Cauchy n^{th} root test.

Q.3 Solve any three of the following questions. **09**

a) Solve: $\frac{dy}{dx}+\frac{2x}{x^2+1}y=\frac{4x^2}{x^2+1}$

b) Find the orthogonal trajectory of family of cardioids $r=a(1+\cos\theta)$

c) Check whether following function is analytic or not. If analytic then find its derivatives. $f(z)=z^2+\bar{z}$

d) Find k such that $f(z)=\frac{1}{2}\log(x^2+y^2)+i\tan^{-1}\frac{ky}{x}$ is analytic.

e) Test the convergence of $\sum\frac{3^n}{2^{n+3}}$

Q.4 Solve any two of the following questions. **10**

a) The charge q on the plate of the condenser of capacity C, charged through a resistance R by a steady voltage V satisfies the differential equation
$R\frac{dq}{dt}+\frac{q}{C}=V$. And $q=0$ when $t=0$. Show that $q=C.V.(1-e^{-t/CR})$

b) Define absolute and conditional convergence. Examine the convergence of the series, $\sum\frac{(-1)^n(n^2+1)}{n^3}$

c) Show that $u=\cos x\cosh y$ is a harmonic function. Find its harmonic conjugate and corresponding harmonic function.

Section – II

Q.5 Solve any three of the following questions. **09**

a) Evaluate $\int_0^\infty x^4 e^{-x^6} dx$

b) Evaluate by using DUIS rule: $\int_0^\infty \frac{e^{-x}(1-\cos ax)}{x} dx$

c) Trace the following curves with full justification $r = a\,(1 - \cos\theta\,)$

d) Change to polar co-ordinate system and evaluate

$$\int_0^a \int_y^a \frac{x\,dxdy}{(x^2+y^2)}$$

e) Find the area by double integration common of the circles $r = a$ and $r = 2\,\alpha\cos\theta$

Q.6 Solve any three of the following questions. **09**

a) Evaluate $\int_0^3 x^3\,(3-x)^4 dx$

b) Trace the curve $x = a(t - \sin t), y = a(1 + \cos t)$

c) Evaluate $\int_0^2 \int_1^2 \int_0^{yz} xyz\,dx\,dy\,dz$

d) Evaluate $\int\int e^{3x+4y} dxdy$ over the triangle $x = 0, y = 0, x + y = 1$

e) Find by double integration the mass of a thin plate bounded by $y^2 = x$ and $x^2 = y$. If the density at any point varies as the square of its distance from the origin.

Q.7 Solve any two of the following questions. **10**

a) State and Prove Duplication Formula.

b) Trace the following curves with full justification $xy^2 = a^2(a - x)$

c) Change the order of integration and evaluate $\int_0^\infty \int_0^x e^{\frac{-x^2}{y}} x\,dx\,dy$

Seat No.	

Set P

F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/ BTCSE0203/ BTEE0203)

Day & Date: Tuesday, 21-05-2024 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The order and the degree of the differential equation $\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}$ is _____.

a) $2, 2$ b) $2, 1$
c) $1, 1$ d) $3, 1$

2) The integrating factor of the D.E. $\frac{dy}{dx} + \frac{2xy}{1+x^2} = 0$ is _____.

a) e^{-x} b) x
c) $1 + x^2$ d) $\frac{1}{1+x^2}$

3) The p-series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is convergent if _____.

a) $p \leq 1$ b) $p = 0$
c) $p > 1$ d) $p = \frac{1}{2}$

4) By D'Alembert's ratio test the series $\sum_{n} \frac{3^n}{2^{n+3}}$ is _____.

a) convergent b) divergent
c) oscillatory d) None of these

5) $\sin ix =$ _____.

a) $\sin hx$ b) $i \sin x$
c) $-\sin ix$ d) $i \sin hx$

6) The sufficient conditions for $f(z)$ to be analytic is _____.

a) $u_x = -v_x,\ u_y = v_y$ b) $u_x = v_y, u_y = -v_x$
c) $u_x = v_y\ , u_y = v_x$ d) $u_x = -v_y, u_y = v_x$

7) $\left[\sin\left(\frac{\pi}{3}\right)+i\cos\left(\frac{\pi}{3}\right)\right]^4$ is equal to _____.

a) $\sin\frac{4\pi}{3}+i\cos\frac{4\pi}{3}$
b) $\sin\frac{\pi}{12}+i\cos\frac{\pi}{12}$
c) $-i\sin\frac{2\pi}{3}+\cos\frac{2\pi}{3}$
d) $\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}$

8) The beta function $B(m,n)$ converges for _____.

a) $m \geq -1, n \geq -1$
b) $m > 0, n \geq -2$
c) $m \geq -1, n > -1$
d) $m > 0, n > 0$

9) If $I(a)=\int_0^1 \frac{x^a-1}{\log x}dx$ then $\frac{dI}{da}=$ _____.

a) $\frac{1}{a-1}$
b) $\frac{1}{a+1}$
c) $\frac{-1}{a+1}$
d) $\frac{1}{\log a}$

10) The curve $x^3+y^3=3xy$ is symmetrical about _____.

a) The line $y=x$
b) x-axis
c) y-axis
d) Both axes

11) The asymptotes obtained by equating the coefficients of the highest powers of x to zero is _____.

a) Parallel to the x-axis
b) Parallel to the y-axis
c) The line $y = x$
d) The line $y=-x$

12) The value of $\int_0^{\frac{\pi}{2}}\int_0^1 r^3\sin\theta\cos\theta\, dr\, d\theta=$ _____.

a) $\frac{\pi}{4}$
b) $\frac{\pi}{8}$
c) $\frac{1}{8}$
d) $\frac{1}{4}$

13) For $\int_0^{4a}\int_0^{2\sqrt{ax}} f(x,y)dy\,dx$ the change of order is _____.

a) $\int_0^{4a}\int_0^{2\sqrt{ay}} f(x,y)dx\,dy$
b) $\int_0^{2\sqrt{ax}}\int_0^{4a} f(x,y)dy\,dx$
c) $\int_0^{4a}\int_{\frac{y^2}{4a}}^{4a} f(x,y)dx\,dy$
d) None of these

14) If the density at any point varies as the distance of the point from the x-axis, then p is equal to _____.

a) kx
b) kxy
c) ky
d) $k(x^2+y^2)$

SLR-JE-712

Seat No.	

Set P

F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/ BTCSE0203/ BTEE0203)

Day & Date: Tuesday, 21-05-2024 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any three of the following questions. 09

a) Solve: $(x+2y-1)dx = (x+2y+1)dy$

b) Solve $(x^4 - 2xy^2 + y^4)dx - (2x^2y - 4xy^3 + \sin y)\,dy = 0$

c) Find the analytic function whose imaginary part is $v = \cos(x)\cosh(y)$

d) Find all the values of $x^4 - x^3 + x^2 - x + 1 = 0$

e) Test the convergence of $\sum \frac{n^3+2}{2^n+2}$ by using D'Alembert's ratio test.

Q.3 Solve any three of the following questions. 09

a) $\frac{dy}{dx} + (2x\tan^{-1} y - x^3)(1+y^2) = 0$

b) Find the orthogonal trajectory of family of curve $y^2 = 4ax$

c) Check whether following function is analytic or not. If analytic then find its derivatives, $f(z) = z^2 + z$

d) By Cauchy's test examine the convergence of $\sum \left(1+\frac{1}{n}\right)^{n^2}$

e) Determine k such that $f(z) = \frac{1}{2}\log(x^2+y^2) + i\tan^{-1}\left(\frac{kx}{y}\right)$ is an analytic function.

Q.4 Solve any two of the following questions. 10

a) When a switch is closed, the current built up in an electric circuit is given by $L\frac{di}{dt} + Ri = E$ if $L = 640, R = 250, E = 500$, and $i = 0$ where $t = 0$. Show the current will approach 2 amp. when $t \to \infty$.

b) Define absolute and conditional convergence. Examine the convergence of the series.

$$-\frac{1}{2} + \frac{2}{5} - \frac{3}{10} + \cdots + (-1)^n \frac{n}{n^2+1} + \cdots$$

c) Prove that $v = e^x \sin y$ is harmonic function. Find its harmonic conjugate u and the analytic function $f(z)$.

Section – II

Q.5 Attempt any THREE of the following. **09**

a) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$

b) Evaluate $\int_2^4 \int_2^x \int_2^{x+y} z\,dz\,dy\,dx$

c) Evaluate $\iint (x^2 - y^2)dxdy$ over the area of the triangle whose vertices are at $(0,1), (1,1), (1,2)$

d) Show that $\int_0^\infty \frac{\log(1+ax^2)}{x^2} dx = \pi\sqrt{a}$

e) Trace the curve $x = a(t + \sin t),\ y = a(1 - \cos t)$

Q.6 Attempt any THREE of the following. **09**

a) Change to polar and evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx\,dy$

b) Trace the curve $r = \mathrm{a}\cos 3\theta$

c) Evaluate $\int_0^9 x^{3/2}(9-x)^{1/2} dx$

d) Find the area included between the curves $y = x^2$ & $y = x^3$

e) Change the order and evaluate $\int_3^5 \int_0^{\frac{4}{x}} x\,y\,dx\,dy$

Q.7 Solve any TWO the following. **10**

a) Determine the mass of lamina of the form $\frac{x^2}{4} + \frac{y^2}{9} = 1$, if the density at any point varies as the product of its distances from the axes of the ellipse.

b) State and Prove duplication formula.

c) Trace the curve with full justification
$x^2y^2 = a^2(y^2 - x^2)$

Seat No.	

Set P

S. Y. (B.Tech.) (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Electrical Engineering
ENGINEERING MATHEMATICS - III

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicates full marks.
3) Use of Non programmable Calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The complete solution of $(D^2+1)y=0$ is _____.
 a) $y=c_1e^x+c_2e^{-x}$ b) $y=c_1\cos x+c_2\sin x$
 c) $y=(c_1+c_2x)e^x$ d) $y=(c_1+c_2)e^x$

2) The P.I of $(D^4-m^4)y=\sin mx$ is _____.
 a) $\frac{x}{4m^3}\cos mx$ b) $\frac{-x}{4m^3}\cos mx$
 c) $\frac{x}{4m^3}\sin mx$ d) $\frac{-x}{4m^3}\sin mx$

3) If $D=\frac{d}{dz}$ and $z=\log x$, then the diff. equation $x\frac{d^2y}{dx^2}+2\frac{dy}{dx}=6x$ becomes ____.
 a) $D(D-1)y=6e^z$ b) $D(D-1)y=6e^{2z}$
 c) $D(D+1)y=6e^{2z}$ d) $D(D+1)y=6e^z$

4) The solution of $\sqrt{p}+\sqrt{q}=1$
 a) $z=ax+\left(1-\sqrt{a}\right)^2+c$ b) $z=ax+by+c$
 c) $z=ax+\left(1+\sqrt{a}\right)^2+c$ d) None of these

5) The general solution of $\left(xD^2-D+\frac{1}{x}\right)y=0$ is _____.
 a) $(c_1+c_2\log x)x$ b) $(c_1+c_2x)e^x$
 c) $(c_1+c_2x)\log x$ d) None of the above

6) The solution of $p^2-q^2=1$ is _____.
 a) $z=ax+\sqrt{a^2-1}y+c$ b) $z=ax+\sqrt{a^2+1}\,y+c$
 c) $z=ax+(a^2-1).y+c$ d) None of these

7) The solution of $p+q=z$ is _____.
 a) $f(x+y,y+\log z)$ b) $f(xy,y\log z)$
 c) $f(x-y,y-\log z)$ d) None of these

8) The value of $\int_c\frac{3z+4}{z(2z+1)}dz=\ldots$ where c is the circle $|z|=1$.
 a) 3π b) $2\pi i$
 c) 4 d) -4

9) $L\left\{\int_0^t \sin 2u\, du\right\} = \cdots$ _______.

a) $\frac{2}{s^2+4}$ b) $\frac{2}{s(s^2+4)}$

c) $\frac{2}{s(s^2-4)}$ d) $\frac{2s}{s^2+4}$

10) $\int_0^\infty \frac{\sin t}{t} dt =$ _______.

a) π b) $\pi/2$

c) $\pi/4$ d) $\pi/3$

11) $L^{-1}\left\{\frac{1}{(s-4)^3}\right\}$ is ______.

a) $e^{4t}\frac{t^2}{2}$ b) $e^{-4t}\frac{t^2}{2}$

c) $e^{4t}\frac{t^3}{6}$ d) $e^{-4t}\frac{t^3}{6}$

12) The value of $\int_c \frac{3z^2+7z+1}{z(z+1)} dz = \cdots$ where c is the circle $|z| = 1/2$.

a) 3π b) 0

c) πi d) -4

13) If $Z\{x_k\} = F(z)$ then $Z\{a^{-k}x_k\} = ?$

a) $F(az)$ b) $\frac{1}{a}F(az)$

c) $aF\left(\frac{z}{a}\right)$ d) $F(z/a)$

14) If $x_k = 1. k \geq 0\ then\ z\{x_k\} = ?$

a) $\frac{z}{z-1}$ b) $\frac{1}{z-1}$

c) $\frac{1}{(z-1)^2}$ d) $\frac{1}{1-z}$

SLR-FR-44

Seat No.	

Set P

S. Y. (B.Tech.) (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Electrical Engineering
ENGINEERING MATHEMATICS-III

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Use of Non programmable calculator is allowed.

Section – I

Q.2 Attempt any three questions from the following. **09**

a) Solve $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + 4y = \cos\log x$.

b) Solve $(D^4 - 1)y = \cos x \cosh x$.

c) Solve $(D^3 - 3D^2 + 3D - 1)y = x^{1/2}e^x$

d) Find the laplace transform of $\int_0^t te^{-3t}\sin(4t)\,dt$

e) Solve $(3x+1)^2\frac{d^2y}{dx^2} - 3(3x+1)\frac{dy}{dx} - 12y = 9x$

Q.3 Attempt any three questions from the following **09**

a) Find the inverse laplace transform of $\frac{1}{s^2(s+1)^2}$

b) Solve $(D^4 + 5D^2 + 4)y = cos\left(\frac{x}{2}\right)\cos\left(\frac{3x}{2}\right)$

c) Solve $(D^3 - 7D + 6)y = x^2$.

d) Evaluate by using laplace transform $\int_0^\infty \left(\frac{e^{-t} - e^{-3t}}{t}\right)dt$

e) Solve $(x^2D^2 + xD - 1)y = x^3$

Q.4 Attempt any two questions from the following. **10**

a) In an $L - C$ circuit the charge q on a plate of a condenser is given by

$$\frac{d^2q}{dt^2} + \frac{q}{cL} = \frac{E_0}{L}\cos nt.$$

If $w^2 = \frac{1}{LC}$ and initially $q = q_0$ at $t = 0$ and the current is $i = i_0$ at $t = 0$ prove that charge at any time t is given by

$$q = q_0\cos wt + \frac{i_0}{w}\sin wt + \frac{E-0}{2Lw}t\sin wt.$$

b) Solve $(D^3 + D)y = \cos t + t^2 + 3$.

c) Find the inverse laplace transform of $\frac{(s^2+2s+3)}{(s^2+2s+2)(s^2+2s+5)}$

Section – II

Q.5 Attempt any three questions from the following. **09**

a) Find the value of $\int_c \frac{z-1}{(z+1)^2(z-2)}dz$ where c is the circle $|z - i| = 2$.

b) Solve $(p^3 + q^3) = 27z$.

c) Find the inverse z-transform of $\frac{z}{(z+a)}$, $|z| < a$.

d) Solve $\left(\frac{1}{z} - \frac{1}{y}\right)p + \left(\frac{1}{x} - \frac{1}{z}\right)q = \left(\frac{1}{y} - \frac{1}{x}\right)$

e) Find the Poles and Residues of $f(z) = \cot z$

Q.6 Attempt any three questions from the following. **09**

a) Solve $pq = xy^2z^4$

b) Evaluate $\int_{(0,0)}^{1,1}(3x^2 + 4xy + 3y^2)dx + 2(x^2 + 3xy + 4y^2)dy$ along $y = x$

c) Find $Z\,\{x_k\}$, where $\{x_k\} = k^2, k \geq 0$.

d) Find $Z^{-1}\left\{\frac{1}{(z-a)^2}\right\}$, $|z| > |a|$.

e) Solve $p(bz - cy) + q(cx - ay) = ay - bx$

Q.7 Attempt any two questions from the following. **10**

a) Evaluate the following integral using residue theorem $\int_c \frac{4-3z}{z(z-1)(z-2)}dz$

Where c is $|z| = \frac{3}{2}$

b) Solve the P.D.E. $\frac{\partial u}{\partial x} - 2\frac{\partial u}{\partial t} = u$, by the method of separation of variables.

c) Find $Z\,\{x_k\}$, where $\{x_k\} = c^k \cos \alpha k, k \geq 0$.

SLR-FJ-5

Seat No.	

Set P

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Q. no. 1 is compulsory & it should be solved in first 30 minutes in answer book page no.3. Each question carries one mark.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions **14**

1) The integrating factor of the differential equation $x\frac{dy}{dx} + (1+x)\,y = e^x$ is
   a) $x\log x$ b) $x + e^x$
   c) xe^{-x} d) xe^x

2) The solution of $\frac{dy}{dx} = -\frac{x^2}{y^2}$ at $x = 1$ and $y = 0$ is
   a) $x^3 + y^3 = 0$ b) $x^3 - y^3 = 1$
   c) $x^3 + y^3 = 3$ d) $x^3 + y^3 = 1$

3) The series $\Sigma\frac{1}{n^p}$, $P > 1$ is
   a) Convergent b) Divergent
   c) Oscillatory d) absolutely convergent

4) In D'Alemberts ratio test if $\lim_{n\to\infty}\frac{u_n}{u_{n+1}} = 1$ then
   a) $\Sigma\, u_n$ converges b) $\Sigma\, u_n$ diverges
   c) the test fail d) $\Sigma\, u_n$ is oscillatory

5) $[\cos\theta - i\,\sin\theta]^4 =$ ________.
   a) $\sin4\theta - i\cos4\theta$ b) $\cos4\theta + i\sin4\theta$
   c) $\cos4\theta - i\sin4\theta$ d) $\sin4\theta + i\cos4\theta$

6) $\sin ix =$ _______.
   a) $\sin hx$ b) $i\,\sin x$
   c) $-\sin\ ix$ d) $i\,\sin hx$

7) Analytic function is also called as _______.
   a) holomorphic b) irregular
   c) harmonic d) Laplace

8) $\frac{B(m+1,n)}{B(m,n)}$ is equal to _______.
   a) $\frac{m}{n}$ b) $\frac{m+1}{n}$
   c) $\frac{m-1}{n}$ d) $\frac{m}{m+n}$

9) The value of $\int_0^\infty \frac{e^{-x}}{x}\,dx$ is ________.
   a) 0 b) ∞
   c) -1 d) 1

10) For the curve $y^2(1+x) = x^2(1-x)$, the origin is a __________.
a) node
b) cusp
c) conjugate point
d) isolated point

11) The numbers of loops of $r = a\,\sin 2\theta$ are _____.
a) two
b) three
c) four
d) eight

12) For $\int_0^\infty \int_x^\infty f(x,y)\,dydx$ by the change of order of integration we get ___.
a) $\int_0^\infty \int_0^x f(x,y)\,dxdy$
b) $\int_x^\infty \int_0^\infty f(x,y)\,dxdy$
c) $\int_0^\infty \int_y^\infty f(x,y)\,dxdy$
d) $\int_0^\infty \int_0^y f(x,y)\,dxdy$

13) The value of $\int_0^{\pi/2} \int_0^{\pi/2} sin\ (x+y)\,dx\,dy$ is ________.
a) 0
b) 2
c) π
d) -2

14) The total mass of the lamina $0 \le x \le 1$, $0 \le y \le 1$ with density at any point equal to xy is _____.
a) 4
b) 2
c) $\frac{1}{2}$
d) $\frac{1}{4}$

SLR-FJ-5

Seat No.	

Set P

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Figures to the right indicate full marks.

Section - I

Q.2 Attempt any three: **09**

a) Solve: $(x-3y+4)dx = (2x-6y+1)dy$

b) Solve: $\frac{dy}{dx} = \frac{y}{2y \log y + y - x}$

c) Solve: $\frac{dy}{dx} + (2x\, tan^{-1}y - x^3)(1+y^2) = 0$

d) Solve: $x^5 = 1 + i$

e) Test the convergence of $\Sigma \frac{3^n}{2^{n+3}}$

Q.3 Attempt any three: **09**

a) Find the orthogonal trajectories of $x^2 + y^2 + 2gx + c = 0$, where g is a parameter.

b) Solve : $y\,(x^2y + e^x)dx - e^x dy = 0$

c) Examine the convergence of $\Sigma \frac{n!3^n}{(n+1)^n}$

d) Find the analytic function whose imaginary part is $tan^{-1}\left({}^{y}/_{x}\right)$.

e) Determine whether the function $\sin z$ is analytic; if so find its derivative.

Q.4 Attempt any two: **10**

a) At a room temperature of 25°, the temperature of a body is 75°. After 15 seconds the temperature of the body was found to be 65°. Find its temperature after 90 seconds.

b) Examine for absolute and conditional convergence of

1) $\Sigma \frac{cosn\pi}{n^2+1}$ 2) $\Sigma(-1)^n \frac{2^{3n}}{3^{2n}}$

c) Prove that the function $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ satisfies Laplace equation and construct the analytic function $f(z)$

Section – II

Q.5 Attempt any three: **09**

a) Evaluate : $\int_0^1 x^3 \left[log\frac{1}{x}\right]^4 dx$

b) Evaluate : $\int_0^\infty \frac{e^{-\alpha x} sinx}{x}\, dx$

c) Trace the curve $x = a\, cos^3 t,\ y = a\, sin^3 t$ with justification.

d) Evaluate : $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x\, dzdxdy$

e) Evaluate : $\iint e^{3x+4y}\, dxdy$ over the triangle. $x = 0,\ y = 0,\ \ x + y = 1$

Q.6 Attempt any three: **09**

a) Evaluate : $$\int_0^3 \frac{x^{3/2}}{\sqrt{3-x}}\,dx$$

b) Evaluate : $$\int_0^{a\sqrt{3}}\int_0^{\sqrt{x^2+a^2}} \frac{x\,dydx}{y^2+x^2+a^2}$$

c) Trace the curve $r^2 = 4cos2\theta$, with justification.

d) Find the mass of the lamina in the form of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, if density at any point varies as the product of distances from the axes of ellipse.

e) Find the area which is inside the cardiod $r = 2(1+cos\theta)$ and outside the circle $r = 2$.

Q.7 Attempt any two: **10**

a) Prove that : $$\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\,dx = B\,(m,n)$$ and hence evaluate $$\int_0^\infty \frac{\sqrt{x}}{(1+x)^2}\,dx$$

b) Trace the curve $xy^2 = a(x^2-a^2)$ with full justification.

c) Change the order of Integration in $\int_0^1\int_{x^2}^{2-x} xydydx$ and hence evaluate.