SLR-TX – 39

Seat No.	

Set **P**

S.E. (Civil) (Part – II) (New – CBCS) Examination, 2018
ENGINEERING MATHEMATICS – III

Day and Date : Wednesday, 28-11-2018 Max. Marks : 70
Time : 2.30 p.m. to 5.30 p.m.

N.B. : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The particular integral of $(D^3 + D)\, y = \cos x$ is

a) $\frac{x}{2}\cos x$ b) $\frac{x}{2}\sin x$ c) $-\frac{x}{2}\cos x$ d) $\frac{1}{2}\cos x$

2) Let $L^{-1}\{\phi_1(s)\} = F_1(t)$ and $L^{-1}\{\phi_2(s)\} = F_2(t)$ then $L^{-1}\{\phi_1(s).\ \phi_2(s)\} =$

a) $\int_0^t F_1(u)\, F_2(t-u)\, du$ b) $\int_0^\infty F_1(u) F_2(t-u) du$

c) $\int_0^t F_1(u)\, F_2(t-u)\, dt$ d) $\int_0^t F_1(t)\, F_2(t-u) du$

3) On putting $x = e^z$ the transformed differential equation of $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = x^{-1}$ is

a) $(D^2 + 1)\, y = e^{-z}$ b) $(D^2 - 1)y = x^{-1}$

c) $(D^2 - 2D + 1)\, y = e^{-z}$ d) $(D^2 - 1)\, y = e^{-z}$

4) $\frac{1}{D-m}\, X =$

a) $e^{-mx}\int e^{mx} x\, dx$ b) $e^{mx}\int e^{-mx} x\, dx$ c) $e^{mx}\int x\, dx$ d) $\int e^{-mx} x\, dx$

5) The solution of partial differential equation $xp + yq = 2z$ is

a) $\phi\left(\frac{x}{y}, \frac{y^2}{z}\right) = 0$ b) $\phi(xy, y^2 z) = 0$ c) $\phi\left(\frac{x}{y}, \frac{y}{z^2}\right) = 0$ d) None of these

P.T.O.

6) L $\{e^{2t} \sinh t\}$ =

a) $\frac{1}{s^2 - 2s + 3}$ b) $\frac{1}{s^2 - 4s + 3}$ c) $\frac{s-2}{s^2 - 4s + 3}$ d) $\frac{1}{s^2 - 4s + 5}$

7) If L { f (t) } = $\frac{2}{s^3} e^{-s}$ then L { f (2t) } =

a) $\frac{16}{s^3} e^{-s/2}$ b) $\frac{4}{s^3} e^{-s}$ c) $\frac{8}{s^3} e^{-2/s}$ d) $\frac{8}{s^3} e^{-s/2}$

8) In a Poisson distribution p (x = 2) = p (x = 3) then the mean m is,

a) 2 b) 3 c) $2/3$ d) $3/2$

9) If 10% pens are defective and if there are 10 pens in the box then the probability that there is no defective pen in box is,

a) 0 b) 0.25 c) 0.35 d) 0.45

10) If $f(x) = \begin{cases} -x, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$ then the value of b_n is,

a) 0 b) π c) $\frac{\pi}{2}$ d) $\frac{\pi^2}{2}$

11) The equations of lines of regression are x + 2y = 5 and 2x + 3y = 8, then mean $\bar{x}$ and $\bar{y}$ are

a) 1 and 2 b) 1 and 3 c) 2 and 3 d) 2 and 5

12) If a curve of the form $y = ax^b$ then the normal equations are

a) $\Sigma \log y = n \log a + b \Sigma \log x$, $\Sigma \log y.x = \log a.x + b \Sigma x^2$

b) $\Sigma y = n a + b \Sigma x$, $\Sigma xy = a \Sigma x + b \Sigma x^2$

c) $\Sigma \log y = n \log a + b \Sigma \log x$, $\Sigma \log x. \log y = \log a \Sigma \log x + b \Sigma (\log x)^2$

d) $\Sigma y = n a + b \Sigma x$, $\Sigma \log (xy) = \log a \Sigma \log x + b \Sigma (\log x)^2$

13) If f(z) is analytic then which of the following is not true ?

a) $f'(z) - u_x + iv_x$ b) $f'(z) = u_y + iv_y$ c) $f'(z) = u_x - iu_y$ d) $f'(z) = v_y + iv_x$

14) The value of $\int_c \frac{z+2}{(z-3)(z-4)} dz$, where C is the circle | z | = 1.

a) πi b) $2\pi i$ c) $6\pi i$ d) 0

Set P

SLR-TX – 39

Seat No.	

S.E. (Civil) (Part – II) (New – CBCS) Examination, 2018
ENGINEERING MATHEMATICS – III

Day and Date : Wednesday, 28-11-2018 Marks : 56
Time : 2.30 p.m. to 5.30 p.m.

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

SECTION – I

2. Attempt **any three** : **(3×3=9)**

a) Solve : $(D^2 - 2D + 2)\,y = \sinh x + \sin\sqrt{2}x$.

b) Solve : $\frac{d^2y}{dx^2} + a^2y = \frac{a^2R}{P}$ $(l - x)$ where a, R, P and l are constants, subject to the conditions y = 0, $\frac{dy}{dx} = 0$ at x = 0.

c) Solve $\frac{y^4z}{x}p + zx^3q = y^4$.

d) Find inverse Laplace transform of $\frac{5s^2 - 7s + 17}{(s-1)(s^2+4)}$.

e) Find $L\left\{\int_0^t te^{-4t}\sin 3t\,dt\right\}$.

3. Attempt **any three** : **(3×3=9)**

a) Solve : $p^2 + q^2 = \frac{3a^2}{z^2}$.

b) Solve : $(D^3 + 3D^2 + 2D)\,y = x^2$.

c) Solve : $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = \frac{12\log x}{x^2}$.

d) Find $L^{-1}\left\{\tan^{-1}\left(\frac{s+a}{b}\right)\right\}$.

e) Find $L\left\{\frac{\cosh 2t \sin 2t}{t}\right\}$.

Set P

4. Attempt **any two** : **(5×2=10)**

a) Solve the following partial differential equation $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial y} + u$, u(x, 0) = $4e^{-3x}$ by the method of separation of variables.

b) Solve : $(3x+2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1$.

c) Evaluate $\int_0^\infty e^{-2t} t^2 \sin 3t \, dt$, by using Laplace transform.

SECTION – II

5. Solve **any three** of the following. **9**

a) Evaluate $\int_C \frac{3z^2 + z}{z^2 - 1} dz$, where 'c' is | z | = 2.

b) Fit a Poisson distribution to the following data

x	:	0	1	2	3	4	**Total**
Frequency (F)	:	192	100	24	3	1	**320**

c) In an examination given by 500 candidates the average and standard deviation of marks obtained are 40 and 10 respectively. Assuming distribution of marks to be normal find approximately i) How many will pass if 50 is fixed as minimum ? ii) What should be minimum if 350 candidates are to pass ?

[given : For SNVZ, Area from z = 0 to z= 1 is 0.3413 and that from z = 0 to z = 0.525 is 0.2]

d) Find the Fourier series for f(x), where f(x) = x + x^2 in (–π, π).

e) Fit a second degree parabola to the following data :

x	:	1	2	3	4	5
y	:	25	28	33	39	46

6. Solve **any three** of the following. **9**

a) Obtain half range cosine series for f(x) = x in the interval (0, 2).

b) From box containing 100 transistors 20 of which are defective. 10 are selected at random. Find the probability that

i) All will be defective

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Set P

c) Evaluate $\int_0^{2+i} (\bar{z})^2 \, dt$, along the line $y = \frac{x}{2}$.

d) Show that u = cos x. cosh y is a harmonic function, find its harmonic conjugate.

e) The equations to the two lines of regression are 6y = 5x + 90 and 15x = 8y + 130. Find the mean of x and y and the coefficient of correlation.

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

a) Find the Fourier series for, f(x) = | cos x| in the interval $(-\pi,\pi)$.

b) Find the equations of the lines of regression and also the coefficient of correlation from the following data.

x	:	62	64	65	69	70	71	72	74
y	:	126	125	139	145	165	152	180	208

c) Evaluate $\int_C \frac{e^z}{(z^2 + \pi^2)^2} \, dz$, where 'c' is | z | = 4.

Set P

SLR-TX – 39

Seat No.	

Set Q

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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a) 2 b) 3 c) $\frac{2}{3}$ d) $\frac{3}{2}$

2) If 10% pens are defective and if there are 10 pens in the box then the probability that there is no defective pen in box is,

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P.T.O.

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Set Q

SLR-TX – 39

Seat No.	

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ENGINEERING MATHEMATICS – III

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SLR-TX – 39

Seat No.	

Set R

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Set R

SLR-TX – 39

Seat No.	

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b) Fit a Poisson distribution to the following data

x	:	0	1	2	3	4	**Total**
Frequency (F)	:	192	100	24	3	1	**320**

c) In an examination given by 500 candidates the average and standard deviation of marks obtained are 40 and 10 respectively. Assuming distribution of marks to be normal find approximately i) How many will pass if 50 is fixed as minimum ? ii) What should be minimum if 350 candidates are to pass ?

[given : For SNVZ, Area from z = 0 to z= 1 is 0.3413 and that from z = 0 to z = 0.525 is 0.2]

d) Find the Fourier series for f(x), where f(x) = x + x^2 in (–π, π).

e) Fit a second degree parabola to the following data :

x	:	1	2	3	4	5
y	:	25	28	33	39	46

6. Solve **any three** of the following. **9**

a) Obtain half range cosine series for f(x) = x in the interval (0, 2).

b) From box containing 100 transistors 20 of which are defective. 10 are selected at random. Find the probability that

i) All will be defective

ii) All are non-defective

iii) At least one is defective.

Set R

c) Evaluate $\int_0^{2+i} (\bar{z})^2 \, dt$, along the line $y = \frac{x}{2}$.

d) Show that u = cos x. cosh y is a harmonic function, find its harmonic conjugate.

e) The equations to the two lines of regression are 6y = 5x + 90 and 15x = 8y + 130. Find the mean of x and y and the coefficient of correlation.

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

a) Find the Fourier series for, f(x) = | cos x| in the interval $(-\pi,\pi)$.

b) Find the equations of the lines of regression and also the coefficient of correlation from the following data.

x	:	62	64	65	69	70	71	72	74
y	:	126	125	139	145	165	152	180	208

c) Evaluate $\int_C \frac{e^z}{(z^2 + \pi^2)^2} \, dz$, where 'c' is | z | = 4.

Set R

SLR-TX – 39

Seat No.	

Set **S**

S.E. (Civil) (Part – II) (New CBCS) Examination, 2018
ENGINEERING MATHEMATICS – III

Day and Date : Wednesday, 28-11-2018 Max. Marks : 70
Time : 2.30 p.m. to 5.30 p.m.

N.B. : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) If $f(x) = \begin{cases} -x, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$ then the value of b_n is,

a) 0 b) π c) $\frac{\pi}{2}$ d) $\frac{\pi^2}{2}$

2) The equations of lines of regression are x + 2y = 5 and 2x + 3y = 8, then mean $\bar{x}$ and $\bar{y}$ are

a) 1 and 2 b) 1 and 3 c) 2 and 3 d) 2 and 5

3) If a curve of the form $y = ax^b$ then the normal equations are

a) $\Sigma \log y = n \log a + b \Sigma \log x$, $\Sigma \log y.x = \log a.x + b \Sigma x^2$

b) $\Sigma y = n a + b \Sigma x$, $\Sigma xy = a \Sigma x + b \Sigma x^2$

c) $\Sigma \log y = n \log a + b \Sigma \log x$, $\Sigma \log x. \log y = \log a \Sigma \log x + b \Sigma (\log x)^2$

d) $\Sigma y = n a + b \Sigma x$, $\Sigma \log (xy) = \log a \Sigma \log x + b \Sigma (\log x)^2$

4) If f(z) is analytic then which of the following is not true ?

a) $f'(z) - u_x + iv_x$ b) $f'(z) = u_y + iv_y$ c) $f'(z) = u_x - iu_y$ d) $f'(z) = v_y + iv_x$

5) The value of $\int_c \frac{z+2}{(z-3)(z-4)} dz$, where C is the circle | z | = 1.

a) πi b) $2\pi i$ c) $6\pi i$ d) 0

P.T.O.

6) The particular integral of $(D^3 + D)\, y = \cos x$ is

a) $\frac{x}{2}\cos x$ b) $\frac{x}{2}\sin x$ c) $-\frac{x}{2}\cos x$ d) $\frac{1}{2}\cos x$

7) Let $L^{-1}\{\phi_1(s)\} = F_1(t)$ and $L^{-1}\{\phi_2(s)\} = F_2(t)$ then $L^{-1}\{\phi_1(s).\ \phi_2(s)\} =$

a) $\int_0^t F_1(u)\, F_2(t-u)\, du$ b) $\int_0^\infty F_1(u) F_2(t-u) du$

c) $\int_0^t F_1(u)\, F_2(t-u)\, dt$ d) $\int_0^t F_1(t)\, F_2(t-u) du$

8) On putting $x = e^z$ the transformed differential equation of $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = x^{-1}$ is

a) $(D^2 + 1)\, y = e^{-z}$ b) $(D^2 - 1)y = x^{-1}$

c) $(D^2 - 2D + 1)\, y = e^{-z}$ d) $(D^2 - 1)\, y = e^{-z}$

9) $\frac{1}{D-m}\, X =$

a) $e^{-mx}\int e^{mx} x\, dx$ b) $e^{mx}\int e^{-mx} x\, dx$ c) $e^{mx}\int x\, dx$ d) $\int e^{-mx} x\, dx$

10) The solution of partial differential equation $xp + yq = 2z$ is

a) $\phi\left(\frac{x}{y}, \frac{y^2}{z}\right) = 0$ b) $\phi(xy, y^2 z) = 0$ c) $\phi\left(\frac{x}{y}, \frac{y}{z^2}\right) = 0$ d) None of these

11) $L\{e^{2t}\sinh t\} =$

a) $\frac{1}{s^2 - 2s + 3}$ b) $\frac{1}{s^2 - 4s + 3}$ c) $\frac{s-2}{s^2 - 4s + 3}$ d) $\frac{1}{s^2 - 4s + 5}$

12) If $L\{f(t)\} = \frac{2}{s^3}e^{-s}$ then $L\{f(2t)\} =$

a) $\frac{16}{s^3}e^{-s/2}$ b) $\frac{4}{s^3}e^{-s}$ c) $\frac{8}{s^3}e^{-2/s}$ d) $\frac{8}{s^3}e^{-s/2}$

13) In a Poisson distribution $p(x = 2) = p(x = 3)$ then the mean m is,

a) 2 b) 3 c) $2/3$ d) $3/2$

14) If 10% pens are defective and if there are 10 pens in the box then the probability that there is no defective pen in box is,

a) 0 b) 0.25 c) 0.35 d) 0.45

Set S

SLR-TX – 39

Seat No.	

S.E. (Civil) (Part – II) (New CBCS) Examination, 2018
ENGINEERING MATHEMATICS – III

Day and Date : Wednesday, 28-11-2018 Marks : 56
Time : 2.30 p.m. to 5.30 p.m.

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

SECTION – I

2. Attempt **any three** : **(3×3=9)**

a) Solve : $(D^2 - 2D + 2)\,y = \sinh x + \sin\sqrt{2}x$.

b) Solve : $\frac{d^2y}{dx^2} + a^2y = \frac{a^2R}{P}$ $(l - x)$ where a, R, P and l are constants, subject to the conditions y = 0, $\frac{dy}{dx} = 0$ at x = 0.

c) Solve $\frac{y^4z}{x}p + zx^3q = y^4$.

d) Find inverse Laplace transform of $\frac{5s^2 - 7s + 17}{(s-1)(s^2+4)}$.

e) Find $L\left\{\int_0^t te^{-4t}\sin 3t\,dt\right\}$.

3. Attempt **any three** : **(3×3=9)**

a) Solve : $p^2 + q^2 = \frac{3a^2}{z^2}$.

b) Solve : $(D^3 + 3D^2 + 2D)\,y = x^2$.

c) Solve : $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = \frac{12\log x}{x^2}$.

d) Find $L^{-1}\left\{\tan^{-1}\left(\frac{s+a}{b}\right)\right\}$.

e) Find $L\left\{\frac{\cosh 2t \sin 2t}{t}\right\}$.

Set S

4. Attempt **any two** : **(5×2=10)**

a) Solve the following partial differential equation $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial y} + u$, u(x, 0) = $4e^{-3x}$ by the method of separation of variables.

b) Solve : $(3x+2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1$.

c) Evaluate $\int_0^\infty e^{-2t} t^2 \sin 3t \, dt$, by using Laplace transform.

SECTION – II

5. Solve **any three** of the following. **9**

a) Evaluate $\int_C \frac{3z^2 + z}{z^2 - 1} dz$, where 'c' is | z | = 2.

b) Fit a Poisson distribution to the following data

x	:	0	1	2	3	4	**Total**
Frequency (F)	:	192	100	24	3	1	**320**

c) In an examination given by 500 candidates the average and standard deviation of marks obtained are 40 and 10 respectively. Assuming distribution of marks to be normal find approximately i) How many will pass if 50 is fixed as minimum ? ii) What should be minimum if 350 candidates are to pass ?

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