CBCS SCHEME

USN | | | | | | | | | |

17MAT31

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Engineering Mathematics – III

Time: 3 hrs.   Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Obtain the Fourier series of $f(x) = x(2\pi - x)$ in $0 \le x \le 2\pi$. **(08 Marks)**

b. Obtain the Fourier series for the function $f(x) = \begin{cases} 1 + 4\frac{x}{3} & \text{in } -\frac{3}{2} < x \le 0 \\ 1 - 4\frac{x}{3} & \text{in } 0 \le x < \frac{3}{2} \end{cases}$ **(06 Marks)**

c. Expand $f(x) = 2x - 1$ as a Cosine half range Fourier series in $0 < x < 1$. **(06 Marks)**

OR

2 a. Obtain the constant term and the coefficients of the first Cosine and Sine terms in the Fourier expansion of 'y' from the table

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(08 Marks)

b. Obtain the Fourier series of $f(x) = |x|$ in $-\pi \le x \le \pi$. **(06 Marks)**

c. Show that the sine half range series for the function $f(x) = \ell x - x^2$ in $0 < x < \ell$ is $\frac{8\ell^2}{\pi^3}\sum_0^\infty \frac{1}{(2n+1)^3} \operatorname{Sin}\left(\frac{2n+1}{\ell}\right)\pi x$. **(06 Marks)**

Module-2

3 a. If $f(x) = \begin{cases} 1 & \text{for } |x| \le a \\ 0 & \text{for } |x| > a \end{cases}$, find the infinite Fourier transform of f(x) and hence evaluate $\int_0^\infty \frac{\operatorname{Sin} x}{x} dx$. **(08 Marks)**

b. Find the Fourier Cosine transform of e^{-x}. **(06 Marks)**

c. Solve by using Z-transforms: $y_{n+2} - 4y_n = 0$, given $y_0 = 0$ and $y_1 = 2$. **(06 Marks)**

OR

4 a. Find the Fourier Sine transform of $\frac{e^{-ax}}{x}$, $a > 0$. **(08 Marks)**

b. Find the Z-transform of Sin (3n + 5). **(06 Marks)**

c. Find the inverse Z-transform of $\frac{2z^2 + 3z}{(z+2)(z-4)}$. **(06 Marks)**

Module-3

5 a. Find the coefficient of correlation for the data

x	1	3	4	2	5	8	9	10	13	15
y	8	6	10	8	12	16	16	10	32	32

(08 Marks)

b. Fit a straight line to the following data

Year	1961	1971	1981	1991	2001
Production (in tons)	8	10	12	10	16

(06 Marks)

c. Compute the real root of $x \log_{10} x - 1.2 = 0$ by Regula – Falsi method. Carry out three iterations in (2, 3). (06 Marks)

OR

6 a. Obtain the lines of Regression for the following values of x and y

x	1	2	3	4	5
y	2	5	3	8	7

(08 Marks)

b. Fit an exponential curve of the form $y - ae^{bx}$ for the following data

No. of petals	5	6	7	8	9	10
No. of flowers	133	55	23	7	2	2

(06 Marks)

c. Find a real root of $x \sin x + \cos x = 0$ near $x = \pi$. Correct to four decimal places, using Newton – Raphson method. (06 Marks)

Module-4

7 a. Given $\sin 45° = 0.7071$, $\sin 50° = 0.7660$, $\sin 55° = 0.8192$, $\sin 60° = 0.8660$, find $\sin 57°$ using an appropriate interpolation formula. (08 Marks)

b. Use Newton's divided difference formula to find f(4) given the data

x	0	2	3	6
f(x)	–4	2	14	158

(06 Marks)

c. Using Simpsons 1/3rd rule, evaluate $\int_0^{\pi/2} \sqrt{\cos\theta}\, d\theta$ by dividing $[0, \pi/2]$ in to 6 equal parts. (06 Marks)

OR

8 a. From the following table find the number of students who have obtained less than 45 marks

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

(08 Marks)

b. Using Lagrange's interpolation formula fit a polynomial of the form x = f(y)

x	2	10	17
y	1	3	4

(06 Marks)

c. Evaluate $\int_0^1 \frac{x}{1+x^2} dx$ by Weddle's rule taking seven ordinates. (06 Marks)

Module-5

9 a. Verify Green's theorem in a plane for $\oint_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$, where 'C' is the boundary of the region enclosed by $y = \sqrt{x}$ and $y = x^2$. **(08 Marks)**

b. Verify Stoke's theorem for $\vec{F} = (x^2 + y^2)i - 2xyj$ taken round the rectangle bounded by the lines $x = \pm a$, $y = 0$ and $y = b$. **(06 Marks)**

c. Derive Euler's equation $\frac{\partial t}{\partial y} - \frac{d}{dx}\left[\frac{\partial t}{\partial y^1}\right] = 0$. **(06 Marks)**

OR

10 a. Use Gauss divergence theorem to evaluate $\iint_S \vec{F}.\hat{n}\,ds$ over the entire surface of the region above xy plane bounded by the cone $z^2 = x^2 + y^2$ the plane $z = 4$ where $\vec{F} = 4xz\,i + xy\,z^2 j + 3z\,K$. **(08 Marks)**

b. Prove that geodesics of a plane are straight lines. **(06 Marks)**

c. Find the extremal of the functional $\int_0^{\pi/2} (y^2 - y^{1^2} - 2y\,\text{Sin}x)\,dx$ under the end conditions $y(0) = y(\pi/2) = 0$. **(06 Marks)**

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CBCS SCHEME

USN

17EE32

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define and distinguish the following network elements :
 i) Active and passive elements
 ii) Linear and nonlinear circuits
 iii) Unilateral and Bilateral circuits
 iv) Lumped and distributed elements. **(08 Marks)**

b. Reduce the network shown in Fig.Q1(b) to a single voltage source in series with a resistance using source transformations.

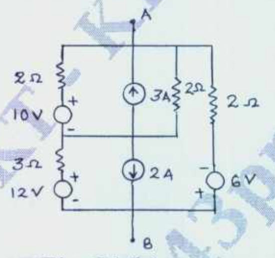

Fig.Q1(b) **(06 Marks)**

c. Derive an expression for Δ to Y transformations. **(06 Marks)**

OR

2 a. The network contains two voltage sources v_1 and v_2 as shown in Fig.Q2(a) with $v_1 = 30\angle 0°$ volts. Determine v_2, such that current in $2 + j3\Omega$ impedance is zero. Use Mesh analysis.

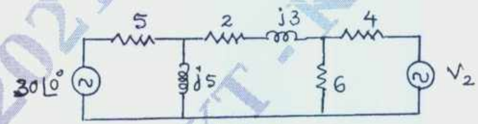

Fig.Q2(a) **(06 Marks)**

b. Determine v_1 and v_2 for the circuit shown in Fig.Q2(b) by using node analysis.

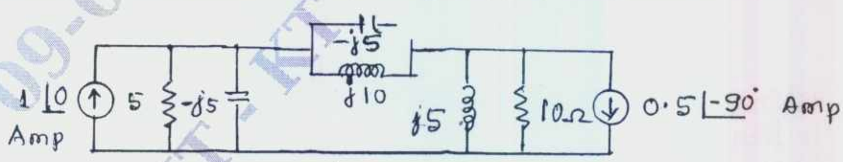

Fig.Q2(b) **(08 Marks)**

c. For the network shown in Fig.Q2(c), draw its dual network.

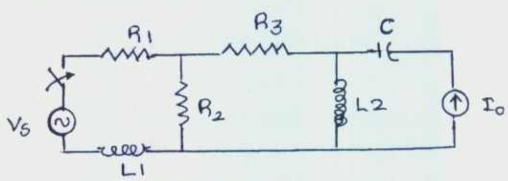

Fig.Q2(c) **(06 Marks)**

Module-2

3 a. State the super position theorem. **(06 Marks)**

b. In the circuit of Fig.Q3(b), use super position principle to determine the value of i_x.

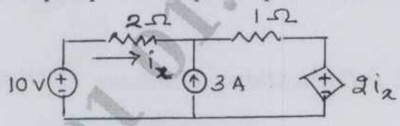

Fig.Q3(b) **(06 Marks)**

c. Find the current i_x and hence verify reciprocity theorem for the network in Fig.Q3(c).

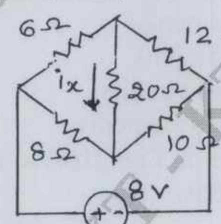

Fig.Q3(c) **(08 Marks)**

OR

4 a. State the Thevenin's theorem. **(06 Marks)**

b. For the network shown in Fig.Q4(b). Obtain the Thevenin's equivalent as seen from the terminals p and q.

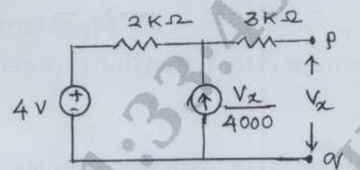

Fig.Q4(b) **(08 Marks)**

c. Find the Norton's equivalent for the circuit shown in Fig.Q4(c).

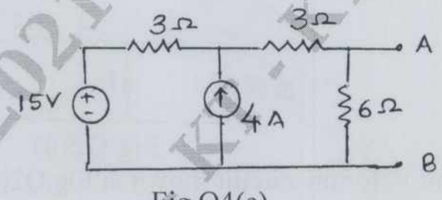

Fig.Q4(c) **(06 Marks)**

Module-3

5 a. Define the following terms with reference to resonant circuit.

i) Resonance
ii) Q – factor
iii) Selectivity
iv) Bandwidth. **(08 Marks)**

b. Prove that $f_r = \sqrt{f_1 f_2}$, where f_1 and f_2 are the two half power frequencies of a resonant circuit. **(06 Marks)**

c. A resistor and a capacitor are in series with a variable inductor. When the circuit is connected to a 200V, 50Hz supply. The maximum current obtainable by varying the inductance is 0.314 Amp. The voltage across the capacitor is 300V. Find the circuit constants. **(06 Marks)**

OR

6 a. In the network of Fig.Q6(a), K is changed from position a to b at t = 0. Solve for $i, \frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0 +, if R = 1000Ω, L = 1H, c = 0.1μF and v = 100volts.

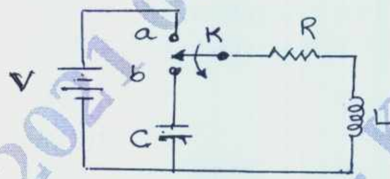

Fig.Q6(a) **(10 Marks)**

b. In the network shown in Fig.Q6(b), the switch K is opened at t = 0. At t = 0+, solve for the value of $v, \frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$, if I = 10 Amp, R = 1000Ω and c = 1μF.

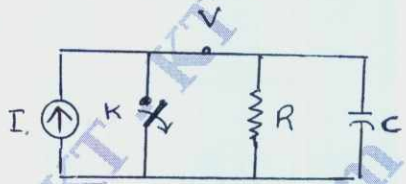

Fig.Q6(b) **(10 Marks)**

Module-4

7 a. Find the Laplace transform of the periodic wave form as shown in Fig.Q7(a).

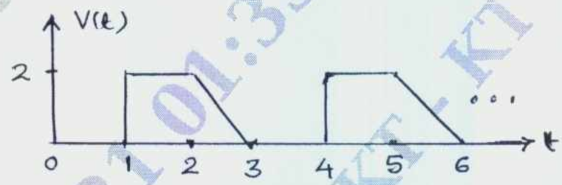

Fig.Q7(a) **(10 Marks)**

b. Find the Laplace transform of the periodic wave form as shown in Fig.Q7(b).

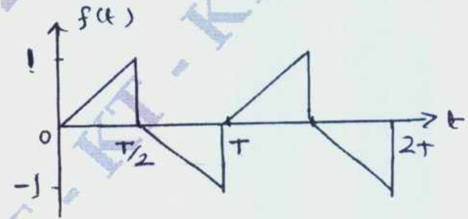

Fig.Q7(b) **(10 Marks)**

OR

8 a. State and prove :
i) Initial value theorem
ii) Final value theorem. **(10 Marks)**

b. Calculate i(0+) using initial value theorem, given that the transform function of the current $I(s) = \frac{2s+5}{(s+1)(s+2)}$. Determine i(t) and obtain its value at t = 2sec. **(10 Marks)**

Module-5

9 a. A three – phase, four wire, 208 volts ABC system supplies a star connected load in which $Z_A = 10\angle 0°$ ohms $Z_B = 15\angle 30°$ ohms and $Z_C = 10\angle -30°$ ohms. Find the line currents, the neutral current and the total power. **(12 Marks)**

b. Explain the method of analyzing 3-phase star connected load by using Milliman's theorem. **(08 Marks)**

OR

10 a. Obtain Z and Y parameters for the circuit shown in Fig.Q10(a).

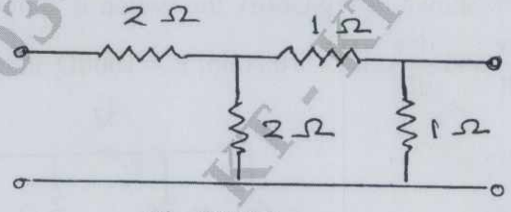

Fig.Q10(a) **(10 Marks)**

b. The following equations gives the relationship between the voltage and currents of a two-port network $I_1 = 0.25v_1 - 0.2v_2$, $I_2 = -0.2v_1 - 0.1v_2$. Obtain T–parameters. **(10 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

17MATDIP31

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Additional Mathematics - I

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Find the modulus and amplitude of $\frac{(1+i)^2}{3+i}$. **(06 Marks)**

b. If $x + \frac{1}{x} = 2\cos\alpha$, then prove that $x^n + \frac{1}{x^n} = 2\cos n\alpha$. **(07 Marks)**

c. Find the fourth roots of $1 - i\sqrt{3}$ and represent them on an argand plane. **(07 Marks)**

OR

2 a. If the vectors $2\hat{i}+\lambda\hat{j}+\hat{k}$ and $4\hat{i}-2\hat{j}-2\hat{k}$ are perpendicular to each other than find the value of λ. **(06 Marks)**

b. Find the sine of the angle between the vectors $\vec{a}=\hat{i}+\hat{j}+\hat{k}$ and $\vec{b}=2\hat{i}-3\hat{j}+2\hat{k}$. **(07 Marks)**

c. Find λ such that the vectors $2\hat{i}-\hat{j}+\hat{k}$, $\hat{i}+2\hat{j}-3\hat{k}$ and $3\hat{i}+\lambda\hat{j}+5\hat{k}$ are coplanar. **(07 Marks)**

Module-2

3 a. Find the n^{th} derivative of $\cos x \cos 2x \cos 3x$. **(06 Marks)**

b. With usual notations prove that $\tan\phi = r\frac{d\theta}{dr}$. **(07 Marks)**

c. Prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{24} + \ldots\ldots$ By using Maclaurin's expansion. **(07 Marks)**

OR

4 a. If $u = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$. **(06 Marks)**

b. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$. **(07 Marks)**

c. If $u = e^x \cos y$, $v = e^x \sin y$, find $J = \frac{\partial(u,v)}{\partial(x,y)}$. **(07 Marks)**

Module-3

5 a. Evaluate $\int_0^{\pi} x\cos^6 x\,dx$. **(06 Marks)**

b. Evaluate $\int_0^1\int_0^1 \frac{dx\,dy}{\sqrt{(1-x^2)(1-y^2)}}$. **(07 Marks)**

c. Evaluate $\int_0^1\int_0^2\int_1^2 x^2 y z\,dx\,dy\,dz$. **(07 Marks)**

OR

6 a. Evaluate $\int \sin^6 x \ dx$. (06 Marks)

b. Evaluate $\iint_R (x^2 + y^2)\ dx\, dy$, where R is the triangle bounded by the lines $y = 0$, $y = x$ and $x = 1$. (07 Marks)

c. Evaluate $\int_0^1 \int_0^1 \int_0^1 e^{x+y+z}\, dx\, dy\, dz$. (07 Marks)

Module-4

7 a. A particle moves along a curve whose position vector is given by $\vec{r} = \left(t - \frac{t^3}{3}\right)\hat{i} + t^2\hat{j} + \left(t + \frac{t^3}{3}\right)\hat{k}$. Find the velocity and acceleration at $t = 3$. (06 Marks)

b. Find the unit normal vector to the surface $xy + x + zx = 3$ at (1, 1, 1). (07 Marks)

c. Find div $\vec{F}$ and curl $\vec{F}$, where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$. (07 Marks)

OR

8 a. A particle moves so that its position vector is given by $\vec{r} = \cos wt\ \hat{i} + \sin wt\ \hat{j}$, where w is a constant. Show that the velocity $\vec{V}$ is perpendicular to $\vec{r}$. (06 Marks)

b. If $\vec{F} = (x + y + 1)\ \hat{i} + \hat{j} - (x + y)\ \hat{k}$, show that $\vec{F}$ curl $\vec{F} = 0$. (07 Marks)

c. Show that $\vec{f} = (\sin y + z)\ \hat{i} + (x \cos y - z)\ \hat{j} + (x-y)\ \hat{k}$ is irrotational. Also find ϕ such that $\vec{f} = \nabla\phi$. (07 Marks)

Module-5

9 a. Solve $\frac{dy}{dx} = 1 + \frac{y}{x} + \left(\frac{y}{x}\right)^2$. (06 Marks)

b. Solve $\frac{dy}{dx} + y \cot x = \sin x$. (07 Marks)

c. Solve $(x^2 + y)dx + (y^3 + x)\ dy = 0$. (07 Marks)

OR

10 a. Solve $\frac{dy}{dx} + \frac{y}{x} = y^2 x$. (06 Marks)

b. Solve $(y \cos x + \sin y + y)\ dx + (\sin x + x \cos y + x)\ dy = 0$. (07 Marks)

c. Solve $y^2 + x^2 \frac{dy}{dx} = xy \frac{dy}{dx}$. (07 Marks)

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CBCS SCHEME

USN | | | | | | | | | | |

17CPH39/49

Third/Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Constitution of India and Professional Ethics and Human Rights

(COMMON TO ALL BRANCHES)

Time: 2 hrs.] [Max. Marks: 30

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the thirty questions, each question carries **ONE mark**.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. When the Indian Constitution given effect
   a) 26.10.1949 b) 26.12.1949
   c) 26.01.1950 d) 26.01.1949

2. Which of the following word was added in the Preamble of the Constitution by 42nd Amendment Act 1976
   a) Socialist b) Sovereign
   c) Federal d) Republic

3. The President power to suspend death sentence temporarily is called
   a) Respite b) Reprieve
   c) Remission d) Constitution

4. The Preamble of the Constitution has been amended so far
   a) 4 times b) 3 times
   c) Twice d) Once

5. Which one of the following is not one of the 3 organs of the state/union?
   a) Executive b) Press
   c) Judiciary d) Legislation

6. Which one of the following states constitution has been removed by the Parliament?
   a) West Bengal b) Nagaland
   c) Sikkim d) J & K

7. Which one of the landmark judgment passed by the Supreme Court in respect of Preamble of the Constitution
a) Beru Bari
b) Keshavananda Bharathi
c) Menaka Gandhi
d) Sonia Gandhi

8. Who is the Neutral person in the affairs of the party politics?
a) C.M.
b) Home Minister
c)Finance Minister
d) Speaker

9. Indian Constitution guarantees reservation of seats to SC and ST in
a) Loksabha and Assembly only
b) Loksabha only
c) Loksabha and Rajyasabha
d) Rajyasabha

10. India is referred to as _____ under the Indian Constitution
a) Country
b) Hindustan
c) India
d) Bharat

11. Who will preside over the joint session of both the houses of the parliament
a) President
b) Prime Minister
c) Speaker
d) Law Minster

12. What is the minimum age for becoming M.P. in Rajyasabha and Loksabha
a) 18 & 25 years
b) 25 & 18 years
c) 35 & 25 years
d) 30 & 25 years

13. The citizens can enforce their Fundamental Rights before SC under Article
a) Art 31
b) Art 32
c) Art 33
d) Art 34

14. Who quoted "Child of Today is Citizen of Tomorrow"?
a) L. Tilak
b) Jawaharlal Nehru
c) B.R. Ambedkar
d) Gandhiji

15. Who quoted "Freedom is my birth right"
a) L. Tilak
b) Jawaharlal Nehru
c) Sardar Patel
d) Gandhiji

16. No person shall be punished for same offence more than once
a)Jeopardy
b) Double Jeopardy
c) Ex-post facto law
d) Testimonial compulsion

17. When the Office of The President falls vacant the same must be filled up within
a)4 months
b) 6 months
c) 12 months
d) 18 months

18. Which important Human Rights is protected under Article 21
a) Right to Equality
b) Right to Life and Personal Liberty
c)Right to Freedom of Speech
d) Right to Religion

19. The Rajya Sabha is
a) Is a Permanent House
b) Has a life of 6 years
c) Has a life of 5 years
d) Has a life of 7 years

20. The Quorum or minimum number of members required to hold the meetings of either houses of the Parliament is
a) One-tenth
b) One-fifth
c) One-third
d) One-fourth

21. Article 19 provides
a) 6 freedoms
b) 7 freedoms
c) 8 freedoms
d) 5 freedoms

22. One of the salient features of our Constitution is
a) It is fully rigid
b) It is fully flexible
c) It is partly rigid and partly flexible
d) None of these

23. Who is the present Speaker of Loksabha
a) Sumithra Mahajan
b) K.S.Hegde
c) Om Birla
d) Venkiah Naidu

24. The Chief Election Commission holds office for a period of
a) 3 yrs
b) 6 yrs
c) 5 yrs
d) 6 yrs or till he attains the age of 65 years

25. The procedure for amending the Constitution is detailed under
a) Art 360
b) Art 368
c) Art 352
d) Art 301

26. Writ of Mandamus can be issued on the ground of
a) Non-performance of public duties
b) Unlawful Detention
c) Unlawful occupation of public offence
d) None of these

27. Engineering Ethics is
a) A macro ethics
b) Business Ethics
c) A preventive ethics
d) A code of scientific rules based on ethics

28. The use of Intellectual Property of others without permission is referred as
a) Cooking
b) Stealing
c) Plagiarism
d) Trimming

29. Who appoints the Lieutenant General to Delhi
a) Prime Minister
b) Home Minister
c) President
d) Vice-President

30. The final interpreter to the Indian Constitution is
a) Speaker of Loksabha
b) Parliament
c) President
d) SC

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