

# CBCS SCHEME

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18MAT31

## Third Semester B.E. Degree Examination, July/August 2021 Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. Find  $L[t e^{-2t} \sin 4t]$ . (06 Marks)
- b. A periodic function of period  $2\pi/\omega$  is defined by  $f(t) = \begin{cases} E \sin \omega t, & 0 \leq t < \pi/\omega \\ 0, & \pi/\omega \leq t < 2\pi/\omega \end{cases}$ . Where E and  $\omega$  are constants. (07 Marks)
- c. Solve :  $y''(t) + k^2 y(t) = 0$ ;  $y(0) = 0$  and  $y'(0) = 1$  by Laplace transformation. (07 Marks)
- 2 a. Find : i)  $L^{-1}\left\{\frac{s^2 - 3s + 4}{s^3}\right\}$  ii)  $L^{-1}\left[\text{Cot}^{-1}\left(\frac{S}{2}\right)\right]$ . (06 Marks)
- b. Find the inverse Laplace transform of  $\frac{1}{(s-1)(s^2+1)}$  by using convolution theorem. (07 Marks)
- c. Express the following function in terms of Heaviside step function and hence find its Laplace transform where  $f(t) = \begin{cases} t^2, & 0 < t \leq 2 \\ 4t, & t > 2 \end{cases}$ . (07 Marks)
- 3 a. Expand  $f(x) = x(2\pi - x)$  as a Fourier series in  $[0, 2\pi]$ . (06 Marks)
- b. Obtain Fourier series for the function  $f(x)$  given by  $f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi}, & 0 \leq x \leq \pi \end{cases}$ . (07 Marks)
- c. Find the half range sine series of  $f(x) = \frac{e^{ax}}{\sinh a\pi}$  in  $(0, \pi)$ . (07 Marks)
- 4 a. Find the Fourier series expansion of  $f(x)$  given by  $f(x) = \begin{cases} 1 & 0 < x < 1 \\ 2 & 1 < x < 3 \end{cases}$ . (06 Marks)
- b. Find the half range sine series for  $x^2$  in  $(0, \pi)$ . (07 Marks)
- c. The values of x and the corresponding values of f(x) over a period T are given below. Show that  $f(x) = 0.75 + 0.37 \cos \theta + 1.004 \sin \theta$  where  $\theta = \frac{2\pi x}{T}$ . (07 Marks)

x	0	T/6	T/3	T/2	2T/3	5T/6	T
f(x)	1.98	1.30	1.05	1.30	-0.88	-0.25	1.98

- 5 a. State: i) Initial and final value theorems ii) Find the Z-transform of  $\cos\left(\frac{n\pi}{2} + \frac{\pi}{4}\right)$ . (06 Marks)
- b. Find the complex Fourier transform of the function  $f(x) = \begin{cases} 1 & \text{for } |x| \leq a \\ 0 & \text{for } |x| > a \end{cases}$ .  
Hence evaluate  $\int_0^{\infty} \left(\frac{\sin x}{x}\right) dx$ . (07 Marks)
- c. Compute the inverse Z-transform of  $\frac{3z^2 + 2z}{(5z-1)(5z+2)}$ . (07 Marks)

- 6 a. Find the Fourier cosine transform of  $f(x) = \begin{cases} x, & 0 < x < 2 \\ 0, & \text{else where} \end{cases}$  (06 Marks)
- b. Find the Z-transform of  $2n + \sin \frac{n\pi}{4} + 1$ . (07 Marks)
- c. Solve the difference equation :  $u_{n+2} - 3u_{n+1} + 2u_n = 0$ , with  $u_0 = 0$  and  $u_1 = -1$ . (07 Marks)
- 7 a. Find by Taylor's series method the value of  $y$  at  $x = 0.1$  to five places of decimals from  $\frac{dy}{dx} = x^2y - 1, y(0) = 1$ . (06 Marks)
- b. Use fourth order Runge-Kutta method to solve  $(x+y)\frac{dy}{dx} = 1, y(0.4) = 1$  at  $x = 0.5$  correct to four decimal places. (07 Marks)
- c. If  $\frac{dy}{dx} = 2e^x - y, y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.040$  and  $y(0.3) = 2.090$ , find  $y(0.4)$  correct to four decimal places by using Milne's predictor - corrector method and applying corrector formula twice. (07 Marks)
- 8 a. Using modified Euler's formula compute  $y(1.1)$  correct to five decimal places given that  $\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^2}$  and  $y = 1$  at  $x = 1$ . [taking  $h = 0.1$ ]. (06 Marks)
- b. Employ Taylor's series method to find  $y$  at  $x = 0.1$  and  $0.2$  correct to four places of decimal. Given  $\frac{dy}{dx} - 2y = 3e^x, y(0) = 0$ . (07 Marks)
- c. Solve the differential equation  $y' + y + xy^2 = 0$  with the initial values of  $y : y_0 = 1, y_1 = 0.9008, y_2 = 0.8066, y_3 = 0.722$  corresponding to the values of  $x : x_0 = 0, x_1 = 0.1, x_2 = 0.2, x_3 = 0.3$  by computing the value of  $y$  corresponding to  $x = 0.4$  applying Adams - Bashforth predictor and corrector formula. (07 Marks)
- 9 a. Given  $y'' - xy' - y = 0$  with the initial conditions  $y(0) = 1, y'(0) = 0$ , compute  $y(0.2)$  using fourth order Runge-Kutta method. (06 Marks)
- b. Derive Euler's equation in the standard form  $\frac{\partial f}{\partial y} - \frac{d}{dx} \left( \frac{\partial f}{\partial y'} \right) = 0$ . (07 Marks)
- c. A heavy cable hangs freely under gravity between two fixed points. Show that the shape of the cable is a catenary. (07 Marks)
- 10 a. Apply Milne's method to compute  $y(0.8)$  given that  $y'' = 1 - 2yy'$  and the following table of initial values. (07 Marks)

x	0	0.2	0.4	0.6
y	0	0.02	0.0795	0.1762
y'	0	0.1996	0.3937	0.5689

- b. Prove that the geodesics on a plane are straight line. (06 Marks)

- c. Find the extremal of the functional :  $\int_{x_0}^{x_1} (y^2 + y'^2 - 2y \sin x) dx$ . (07 Marks)

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# CBCS SCHEME

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18EE32

## 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 :
- i) Linear and non linear circuit
  - ii) Active and passive circuit
  - iii) Unilateral and bilateral circuit.
- (06 Marks)
- b. For the circuit shown in Fig.Q1(b) determine resistance between M and N using star/delta transformation.

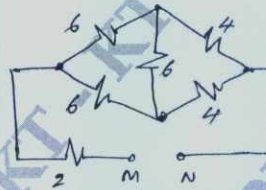


Fig.Q1(b)

(06 Marks)

- c. Use node voltage analysis to find node voltages in the network shown in Fig.Q1(c).

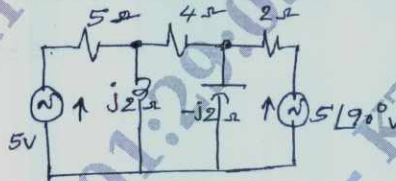


Fig.Q1(c)

(08 Marks)

### OR

- 2 a. Derive an expression for converting Delta to Star. (06 Marks)
- b. Determine potential difference between M and N using source transformation of circuit shown in Fig.Q2(b).

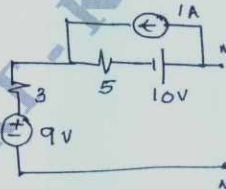


Fig.Q2(b)

(06 Marks)

- c. Use Mesh current analysis to find the current flowing in 30Ω resistor of circuit shown in Fig.Q2(c).

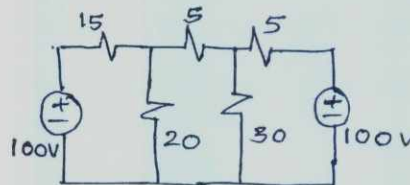


Fig.Q2(c)

(08 Marks)

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-2**

- 3 a. State and prove reciprocity theorem. (06 Marks)  
 b. For the circuit shown in Fig.Q3(b) find ' $I_x$ ' using super position theorem. (07 Marks)

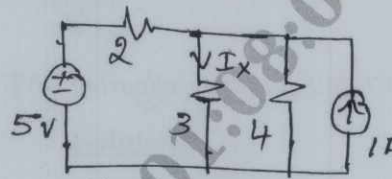


Fig.Q3(b)

- c. Use Milliman's theorem to find current in the circuit shown in Fig.Q3(c). (07 Marks)

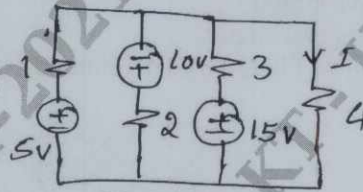


Fig.Q3(c)

**OR**

- 4 a. State and obtain condition for maximum power when load impedance is equal to pure variable resistance. (06 Marks)  
 b. For the network shown in Fig.Q4(b), find current ' $I$ ' using Norton's theorem. (07 Marks)

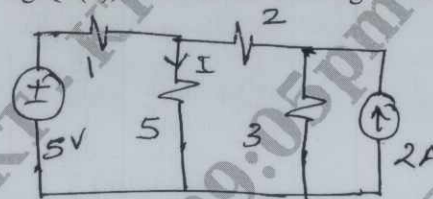


Fig.Q4(b)

- c. For the network shown in Fig.Q4(c). Draw Thevenin's equivalent circuit. (07 Marks)

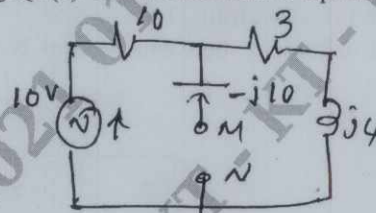


Fig.Q4(c)

**Module-3**

- 5 a. Show that resonant frequency is the geometric mean of cut-off frequencies. (07 Marks)  
 b. A series RLC circuit has a resistance of  $100\Omega$ , an inductance of  $0.5H$  and capacitance of  $0.4\mu F$ . Find the resonant frequency, half power frequencies, band width and quality factor. (07 Marks)  
 c. For the circuit shown in Fig.Q5(c), find the value of inductance take  $\omega = 500r/s$ . (06 Marks)

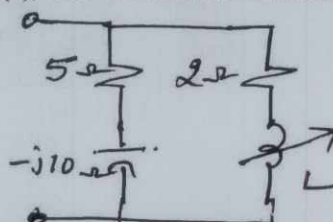


Fig.Q5(c)

OR

- 6 a. Explain the behavior of R, L and C for initial condition. (07 Marks)  
 b. For the network shown in Fig.Q6(b) switch is closed at  $t = 0$ . Determine current and its first and second derivative at  $t = 0^+$ .

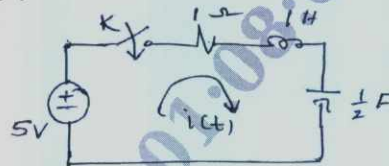


Fig.Q6(b)

(07 Marks)

- c. For the R-L circuit shown in Fig.Q6(c). Obtain the expression for current  $i(t)$  for  $t \geq 0$ .

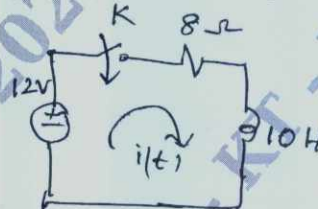


Fig.Q6(c)

(06 Marks)

**Module-4**

- 7 a. State and prove initial value theorem. (06 Marks)  
 b. Find the inverse Laplace transform of  

$$V(s) = \frac{10}{s(s+1)(s+2)}$$
 (07 Marks)  
 c. For the network shown in Fig.Q7(c), draw the transformed circuit and obtain the expression for current  $i(t)$  for  $t \geq 0$ .

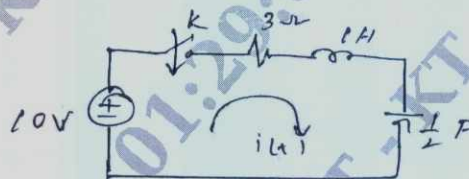


Fig.Q7(c)

(07 Marks)

OR

- 8 a. Find the ILT of: i) step signal ii) Ramp iii) impulse signal. (06 Marks)  
 b. For the waveform shown in Fig.Q8(b) obtain the Laplace transform.

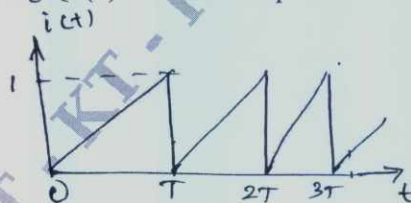


Fig.Q8(b)

(08 Marks)

- c. Find the initial and final value of following functions :

i)  $V_1(s) = \frac{s^2 + 3s + 2}{s^3 + 3s^2 + 3s + 1}$

ii)  $V_2(s) = \frac{10}{s(s+3)}$

(06 Marks)



**Module-5**

- 9 a. A 3 phase supply with line voltage of 250V has a unbalanced Delta connected load as shown in Fig.Q9(a). Determine line currents, active and reactive power for phase sequence A B C.

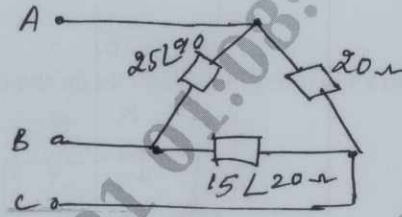


Fig.Q9(a)

(10 Marks)

- b. An unbalanced 4 wire star connected load has a balanced supply of 400V. For the phase sequence ABC, calculate the line currents and total power of the circuit shown in Fig.Q9(b).

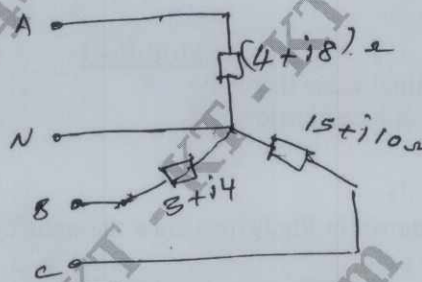


Fig.Q9(b)

(10 Marks)

**OR**

- 10 a. Obtain the Impedance parameters in terms of Admittance parameters. (10 Marks)  
 b. For the network shown in Fig.Q10(b) determine z-parameters. (10 Marks)

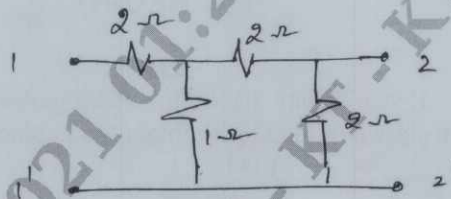


Fig.Q10(b)

(10 Marks)

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# CBCS SCHEME

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18EE33

## Third Semester B.E. Degree Examination, July/August 2021 Transformers and Generators

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Write short notes on V – V connection. (06 Marks)  
b. State the advantages of single three phase transformer over bank of single phase transformers. (06 Marks)  
c. Find the all day efficiency of single phase transformer having maximum efficiency of 98% at 15KVA at UPF and loaded as follows :  
12 hours – 2 KW at 0.5 pf lagging  
6 hours – 12 KW at 0.8 pf lagging  
6 hours – No load. (08 Marks)
- 2 a. Draw and explain the full load phasor diagrams of 1 $\phi$  transformers for lagging, leading and UPF load. (10 Marks)  
b. A 20 KVA, 2000/200V single phase transformer has the following parameters. HV winding  $R_1 = 3\Omega$ ,  $X_1 = 5.3\Omega$ ,  $R_2 = 0.05\Omega$ ,  $X_2 = 0.1\Omega$ . Find the voltage regulation at 0.8pf lagging. (05 Marks)  
c. A 3 $\phi$  step down transformer is connected to 6600V and it takes 10A. Calculate the secondary line voltage, line current and output for : i) star – delta ii) Delta – Delta. (05 Marks)
- 3 a. Derive the expression for load shared between two transformers connected in parallel when voltage ratios are different with phasor diagram. (10 Marks)  
b. In a Sumpner's test on two identical single phase transformers rated 500KVA, 11/0.4KV, 50Hz, the wattmeter reading on HV side is 6000W and on LV side is 15000W. Find the efficiency of each transformer on half full load of 0.8pF. What will be its maximum efficiency? (10 Marks)
- 4 a. What are the conditions to be satisfied for parallel operation of two transformers? Explain briefly. (06 Marks)  
b. Derive an expression for saving of copper when an auto transformer is used. (08 Marks)  
c. Compare auto transformer with two winding transformer. (06 Marks)
- 5 a. Derive EMF equation of a 3 $\phi$  alternator. (06 Marks)  
b. What are the methods used to reduce harmonics in 3 $\phi$  alternators? Explain. (06 Marks)  
c. What is armature reaction? With neat figures explain in detail. (08 Marks)
- 6 a. A 3 $\phi$ , 50Hz, 10 pole alternator has 90 slots. The flux per pole is 0.15Wb. If the winding is to be star connected to give a line voltage of 11000V. Find the number of armature conductors to be connected in series/phase. Assume  $K_p = 1$ . (06 Marks)  
b. Write short notes on synchronous reactance. (06 Marks)  
c. What is commutation? What are the methods available for improving commutation? Explain briefly. (08 Marks)

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.



- 7 a. Enumerate the methods available for determining the voltage regulation of an alternator. Explain ZPF method in detail. (10 Marks)
- b. A 2300V, 50Hz, 3 $\phi$  star connected alternator has an effective armature resistance of 0.2 $\Omega$ . A field current of 35A produces a current of 150A on short circuit and an open circuit emf 780V(line). Calculate the voltage regulation at 0.8pF lagging and 0.8pF leading for the full load current of 25A. (10 Marks)
- 8 a. Show that the short circuit ratio of an alternator is the reciprocal of the per unit value of the synchronous reactance at rated value. Explain its significance. (10 Marks)
- b. A 10 KVA, 440V, 50Hz, 3 $\phi$  star connected alternator has the OCC as given below :

$J_f$ (A)	1.5	3	5	8	11	15
$V_{OC}$ (line) (Volts)	150	300	440	550	600	635

With full load zero pF, the applied excitation required is 14A to produce 500V of terminal voltage. On short circuit, 4A excitation is required to give full load current. Determine the voltage, regulation for full load, 0.8pF lagging and leading. (10 Marks)

- 9 a. Write a short note on capability curves of synchronous generator. (06 Marks)
- b. What is hunting in synchronous machines? Explain the role of damper windings. (06 Marks)
- c. What is synchroscope? How it is used for synchronization of alternators? (08 Marks)
- 10 a. With a phasor diagram, explain the concept of two reaction theory in a salient pole synchronous machine. (07 Marks)
- b. With a neat circuit diagram, explain the slip test on salient pole synchronous machines and indicate how  $X_d$  and  $X_q$  can be determined. (07 Marks)
- c. An alternator has a direct axis synchronous reactance of 0.7 per unit and a quadrature axis synchronous reactance of 0.4 per unit. It is used to supply full load at rated voltage at 0.8pF. Find the total induced emf on open circuit. (06 Marks)

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# CBCS SCHEME

18CPC39/49

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Question Paper Version : A

**Third/Fourth Semester B.E Degree Examination, July/August 2021**  
**Constitution of India, Professional Ethics and Cyber Law**  
**(COMMON TO ALL BRANCHES)**

Time: 2 hrs.]

[Max. Marks: 100

## INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred 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.

- 
1. The Indian Constitution is,  
a) Based on convention  
b) A brief document  
c) An evolved constitution  
d) Written and Lengthy document
  2. The Phrase Economic Justice is found in,  
a) Fundamental rights  
b) Preamble and Directive principle of state policy  
c) Fundamental duties and DPSP  
d) Fundamental duties
  3. The total number of Articles in the Indian Constitution in 1950 is,  
a) 397  
b) 395  
c) 400  
d) 445
  4. The President/Chairman of the constituent assembly was,  
a) Jawaharlal Nehru  
b) M.K. Gandhi  
c) Dr. B. R. Ambedkar  
d) Dr. Babu Rajendra Prasad
  5. Our Constitution was adopted on,  
a) 26<sup>th</sup> Jan 1950  
b) 26<sup>th</sup> Nov 1949  
c) 15<sup>th</sup> Aug 1947  
d) 26<sup>th</sup> Feb 1946
  6. Which of the following is not a fundamental right,  
a) Right to Freedom  
b) Right to Property  
c) Right to Constitutional Remedies  
d) Right to Religion
  7. In case of illegal detention of a Person the High court or Supreme court issue \_\_\_\_\_ writ,  
a) Mandamus  
b) Quo-warranto  
c) Habeas corpus  
d) Certiorari

8. The term "Secular" means,  
 a) Peoples Government  
 b) No King or Queen  
 c) Equal opportunity to all  
 d) Treating all religions equally
9. Which of these article is known as heart and soul of our constitution,  
 a) Article - 19  
 b) Article - 14  
 c) Article - 21  
 d) Article - 32
10. A Person arrested has to be produced before the Magistrate within,  
 a) One week  
 b) 72 hours  
 c) 48 hours  
 d) 24 hours
11. The Government of India Act of 1935, Abolished  
 a) Dyarchy at the centre  
 b) Dyarchy at the province  
 c) Provincial Autonomy  
 d) All the above
12. The Right to Equality is under Article,  
 a) 12  
 b) 14  
 c) 19  
 d) 21
13. Freedom of Assembly is under Article  
 a) 14  
 b) 15  
 c) 19  
 d) 21
14. Fundamental Duties were incorporated in the constitutional amendment number,  
 a) 42<sup>nd</sup>  
 b) 44<sup>th</sup>  
 c) 45<sup>th</sup>  
 d) 46<sup>th</sup>
15. Under the Indian Constitution subjects of administration are divided into,  
 a) 2 lists  
 b) 3 lists  
 c) 4 lists  
 d) 5 lists
16. Right to constitutional remedies is provided in the  
 a) Art-12  
 b) Art-14  
 c) Art-19  
 d) Art-32
17. The Speaker of the Loka Sabha is,  
 a) Appointed by PM  
 b) Appointed by the President  
 c) Selected by the member of Lok Sabha  
 d) Selected by the member of Parliament
18. Chairman of the constitution drafting committee was,  
 a) Jagjivan Ram  
 b) M K Gandhi  
 c) Jawaharlal Nehru  
 d) Dr. B. R. Ambedkar
19. The word "Secular" was inserted in the constitution,  
 a) Preamble  
 b) Directive principle of state policy  
 c) Fundamental right  
 d) Fundamental duties
20. Fundamental duties in the Indian are provided by way of,  
 a) Amendment  
 b) Order of supreme court  
 c) G.O.  
 d) Order of President
21. The executive power of the state is vested in the,  
 a) Governor  
 b) Chief Minister  
 c) President  
 d) Chief Secretary
22. \_\_\_\_\_ Administer oath of office to the governor,  
 a) PM  
 b) CM  
 c) President  
 d) Chief Justice of the High Court
23. The total number of Ministers including the CM of a state shall not exceed \_\_\_\_\_ of the total number of MLAs,  
 a) 12%  
 b) 15%  
 c) 20%  
 d) 40%



24. The minimum age stipulated to become MLC is,  
a) 25                      b) 30                      c) 35                      d) 40
25. The Chief Minister shall be appointed by the,  
a) PM                      b) President                      c) Chief Justice                      d) Governor
26. The Governor of a state is appointed by,  
a) PM                      b) CM                      c) President                      d) Party High Command
27. The term of the state assembly is,  
a) 4 year                      b) 5 year                      c) 6 year                      d) 3 year
28. The Judge of a High Court may be removed by,  
a) PM                      b) CM                      c) President                      d) By a process of impeachment
29. The High Court Jurisdiction under Article 226 is called,  
a) Original Jurisdiction                      b) Writ Jurisdiction                      c) Appellate                      d) Residual
30. Under Article \_\_\_\_\_ of the constitution parliament has the power to amend the constitution,  
a) Article 256                      b) Article 311                      c) Article 356                      d) Article 368
31. Which of the following is known as the fundamental right case,  
a) Kesavananda Bharati case                      b) Minerva Mills case  
c) Maneka Gandhi case                      d) Golaknath case
32. \_\_\_\_\_ Constitutional Amendment reduced the voting age from 21 years to 18 years  
a) 41<sup>st</sup>                      b) 61<sup>st</sup>                      c) 73<sup>rd</sup>                      d) 74<sup>th</sup>
33. Right to Education (RTE) was introduced in Amendment  
a) 46<sup>th</sup>                      b) 61<sup>st</sup>                      c) 76<sup>th</sup>                      d) 86<sup>th</sup>
34. \_\_\_\_\_ Amendment introduced GST,  
a) 99<sup>th</sup>                      b) 100<sup>th</sup>                      c) 101<sup>st</sup>                      d) 103<sup>rd</sup>
35. Rajya Sabha member has a term of \_\_\_\_\_ year,  
a) 4                      b) 5                      c) 6                      d) 8
36. The Indian Constitution gives the Power of Amending the constitution to,  
a) Parliament                      b) President                      c) PM                      d) Supreme court of India
37. Who is neutral in the affairs of the party politics,  
a) Chief Minister                      b) Home Minister                      c) Finance Minister                      d) Speaker
38. Legally permissible age of marriage the boys and girls is  
a) 25 & 21                      b) 25 & 18                      c) 21 & 18                      d) 18 & 18
39. This is not a function of the Election commission,  
a) Selection of candidate                      b) Preparing Electoral rolls  
c) Issue code of conduct                      d) Allotment of symbols
40. Under which Article the President, on Receipt of a Report from the Governor or otherwise, may impose President rule in a state,  
a) 351                      b) 352                      c) 353                      d) 356

41. T.N. Seshan was the \_\_\_\_\_ of India.  
 a) Election commissioner  
 b) Chief Election Commissioner  
 c) Election observer  
 d) Election controller
42. The Chief Justice of High court is appointed by the,  
 a) PM  
 b) CM  
 c) President  
 d) Chief Justice of India
43. Who is the Chairman of the Rajya Sabha,  
 a) President  
 b) PM  
 c) Speaker  
 d) Vice-President
44. Which of the following Articles provides Right to Protection of Life and Property  
 a) 14  
 b) 19  
 c) 21  
 d) 22
45. Bi-Cameral means  
 a) One house  
 b) Two house  
 c) One+Two houses  
 d) None of these
46. To Declare National Emergency a decision must be taken by the,  
 a) Rajya Sabha  
 b) Lok Sabha  
 c) Cabinet  
 d) Parliament
47. Which of the following is the guardian of the constitution,  
 a) President  
 b) Parliament  
 c) Lok Sabha  
 d) Supreme court
48. Re-organisation of States on Linguistic lines was done in \_\_\_\_\_ Amendment.  
 a) 1<sup>st</sup>  
 b) 3<sup>rd</sup>  
 c) 5<sup>th</sup>  
 d) 7<sup>th</sup>
49. \_\_\_\_\_ Constitutional Amendment Restricted the Council of Minister to 15% of the legislature membership,  
 a) 86<sup>th</sup>  
 b) 65<sup>th</sup>  
 c) 78<sup>th</sup>  
 d) 91<sup>st</sup>
50. Can the Governor be the Governor for two states,  
 a) No  
 b) Yes  
 c) One state and One UT  
 d) 2 UTs
51. Who is the Present Governor of Karnataka,  
 a) T N Chaturvedi  
 b) Hamsaraj Bhardwaj  
 c) Vajubhai Vala  
 d) Thawar Chand Gehlot
52. Who is the Present President of India?  
 a) Man Mohan Singh  
 b) R N Kovid  
 c) Amit Shah  
 d) Narendra Modi
53. Which was the lengthiest Amendment to Constitution,  
 a) 24<sup>th</sup>  
 b) 42<sup>nd</sup>  
 c) 43<sup>rd</sup>  
 d) 44<sup>th</sup>
54. The commission appointed to investigate the condition of Backward classes was headed by,  
 a) Mandal  
 b) Nanavathi  
 c) Sarkaria  
 d) Narasimha
55. The total number of Election Commissioners including the CEC is  
 a) 3  
 b) 4  
 c) 5  
 d) 6



56. \_\_\_\_\_ Amendment provided for antailment of Fundamental Rights, imposes Fundamental Duties and made changes to the basic structure of the constitution by adding "Socialistic and Secular".  
 a) 40<sup>th</sup>                      b) 41<sup>st</sup>                      c) 42<sup>nd</sup>                      d) 44<sup>th</sup>
57. \_\_\_\_\_ Administer Oath to the CM of a state.  
 a) PM                      b) President                      c) Governor                      d) Chief Justice
58. The Right to enforce fundamental rights is enshrined in article \_\_\_\_\_ of the constitution.  
 a) 12                      b) 14                      c) 19                      d) 32
59. Who is the Supreme Commander of Armed forces in India?  
 a) PM                      b) President                      c) Chief Justice                      d) Speaker of Loksabha
60. To become Governor one has to attain the age of \_\_\_\_\_ year.  
 a) 30                      b) 35                      c) 40                      d) 50
61. Engineers can use the code of Ethics as guidelines to,  
 a) Resolve the conflicts                      b) Formulate the problem  
 c) Shift the responsibility                      d) Overcome the work pressure
62. In \_\_\_\_\_ concept of responsibility, an attention is being paid to those who are the risk of being harmed.  
 a) Minamalist                      b) Reasonable care  
 c) Good work view                      d) All of these
63. In Engineering R and D, retaining the data to draw a non-contradictory statement and discarding the rest is called,  
 a) Cooking                      b) Trimming                      c) Scanning                      d) Skimming
64. Stealing of IPR means,  
 a) Cooking                      b) Forgery                      c) Trimming                      d) Plagiarism
65. Which of the following is not an impediment to responsibility,  
 a) Group think                      b) Microscopic vision                      c) Ego-centric                      d) Trade mark
66. Engineer's expert testimony in technical investigation demand,  
 a) Adaquate time for through investigation                      b) Scanning and skimming information  
 c) Smoothing of irregularities to make the data appear accurate and precise.  
 d) Retaining and Manipulating data
67. Revealing confidential information Amounts to,  
 a) Violation of patent                      b) Misuse of trust  
 c) Breach of contract                      d) Criminal Breach of trust
68. A professional engineer can take the help of codes of ethics when he has,  
 a) Doubts                      b) Legal problems  
 c) Ethical crisis                      d) Confusion
69. Fear is \_\_\_\_\_ to responsibility  
 a) A way of shift                      b) an Impediment  
 c) Way to corrupt                      d) All of these

70. Engineer may not be held legally liable for causing harm, when the harm is caused,  
 a) Intentionally  
 b) Ignorantly  
 c) Negligently  
 d) Recklessly
71. Which of the following is NOT preserved as an Intellectual property?  
 a) Copy rights  
 b) Patents  
 c) Trade secrets  
 d) Government regulation
72. It is not a kind of trade mark,  
 a) Designs  
 b) Symbols  
 c) Sounds  
 d) Goodwill
73. This is not dishonesty in Engineering Research and Testing,  
 a) Crimping  
 b) Forging  
 c) Cooking  
 d) Plagiarism
74. Ego centric tendencies mean,  
 a) Superiority complex  
 b) Interpreting situation from a limited view  
 c) Arrogant and irresponsible behaviour  
 d) Habit of condemning the views of others
75. No code will be give \_\_\_\_\_ to get solution for ethical problems,  
 a) Guidelines  
 b) Set of Ideas  
 c) An algorithm  
 d) Ethical standard
76. Which of the following is not considered the aim of engineering ethics,  
 a) Moral imagination  
 b) Identification of ethical issues  
 c) Development of analytical skills  
 d) Responsibility shifting
77. The public is put to increased risk by allowing increased number of deviation from specific safety standard and acceptable risk is known as,  
 a) Normal accident  
 b) Normalising deviation  
 c) Risk assessment  
 d) Over estimated risk
78. Which of the following is basic attitude towards responsibility,  
 a) Vigilant view  
 b) Minimalist view  
 c) Moralist view  
 d) All of these
79. A fault tree is used to,  
 a) Assess the risk involved  
 b) To claim compensation  
 c) Take free consent  
 d) To improve safety
80. Cooking means,  
 a) Boiling under pressure  
 b) Retaining results which fit the theory  
 c) Making deceptive statements  
 d) Misleading the public.
81. What is the name of the IT Law that India is having in the Indian legislature?  
 a) India's Technology (IT) Act, 2000  
 b) India's Digital Information Technology Act (DIT) 2000  
 c) India's Information Technology Act (IT), 2000  
 d) The Technology Act, 2008
82. Under which section of IT Act, stealing any digital asset or information is written a cyber crime,  
 a) 65  
 b) 65-D  
 c) 67  
 d) 70



83. Download copy, extract data from an open system done fraudulently is treated as \_\_\_\_\_,  
a) Cyber-warfare    b) Cyber security Act    c) Data-back up    d) Cyber-crime
84. Any digital content, which any incidental crates and is not acceptable to the society it's a cyber crime that comes under \_\_\_\_\_ of IT Act.  
a) Section 66    b) Section 67    c) Section 68    d) Section 69
85. IT Act 2008 make cyber crime details more precise where it mentioned if anyone publishes sexually explicit digital content then under \_\_\_\_\_ of IT Act, 2008 he/she has to pay a legitimate amount of fine,  
a) Section 67-A    b) Section 67-B    c) Section 67-C    d) Section 67-D
86. Which section of IT Act deals with the appointment of controller of certifying authorities?  
a) Section 5    b) Section 15    c) Section 10    d) Section 17
87. IT 2000 amended various sections of which of the following Acts?  
a) Indian Penal Code 1860  
b) Reserve Bank of India, Act 1934  
c) Indian Evidence Act and Bankers Book Evidence Act 1891  
d) All the above
88. Which section of IT Act deals with child pornography?  
a) Section 67 A    b) Section 67 B    c) Section 67 F    d) Section 67 C
89. Repeated harassment and threatening behavior towards someone through internet or email is known as,  
a) Cyber Phishing    b) Cyber defamation    c) Cyber stalking    d) Cyber spoofing
90. Unauthorised control/access over computer system and destroying computer data and program is known as,  
a) Cracking    b) Hacking    c) Piracy    d) Cyber smear
91. What is the maximum term of punishment for hacking a computer system as per IT Act 2000?  
a) 1 year    b) 3 years    c) 5 years    d) 4 years
92. Any criminal entity that uses computer as a instrumentality/Target or means for perpetuating further crimes comes within one ambit of,  
a) Software piracy    b) Cyber crimes  
c) Conventional crimes    d) Data crimes
93. Private key is used to,  
a) Digitally sign    b) Verify the sign  
c) Verify the door stage    d) Make payments
94. \_\_\_\_\_ means a person who has been granted a license to issue a digital signature certificate,  
a) Controller    b) Certifying authority    c) Certified issuer    d) Licensed authority
95. \_\_\_\_\_ is a person in whose name the digital signature certificate is issued,  
a) Certified authority    b) Subscriber  
c) Holder    d) Controller

96. UNICITRAL stands for \_\_\_\_\_  
a) United Nations Centre for Indian Trade law.  
b) United nations Commission on International Trade Laws.  
c) United Nations Commission for Indian Trade Law.  
d) United Nations Commission for Information Trade Laws.
97. \_\_\_\_\_ is known as publication without justification or lawful excuse which tends to injure the reputation of person by exposing that person hatred and contempt.  
a) Cyber Squatting  
b) Cyber defamation  
c) Cyber Stalking  
d) Cyber phishing
98. Which are the sections of IT Act applicable for cyber pornography?  
a) 66, 66A, 66B  
b) 67, 67A, 67B  
c) 67, 67C, 67D  
d) None of the above
99. Which section deals with the use of electronic records and digital signature in government and its agencies?  
a) Section 3  
b) Section 5  
c) Section 6  
d) Section 7
100. Which is the appeal court on the orders issued by cyber appellate tribunal?  
a) Munsiff court  
b) District court  
c) High Court  
d) Supreme court

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# CBCGS SCHEME

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18MATDIP31

## Third Semester B.E. Degree Examination, July/August 2021 Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions.*

1. a. Show that  $(1 + \cos\theta + i\sin\theta)^n + (1 + \cos\theta - i\sin\theta)^n = 2^{n+1} \cos^n\left(\frac{\theta}{2}\right) \cos\left(\frac{n\theta}{2}\right)$ . (07 Marks)  
 b. Express  $1 - i\sqrt{3}$  in polar form and hence find its modulus and amplitude. (06 Marks)  
 c. Express  $\frac{1}{1 - \cos\theta + i\sin\theta}$  in the form  $a + ib$  and also find its conjugate. (07 Marks)
  
2. a. Define dot product between two vectors A and B. Find the sine of the angle between the vectors  $\vec{A} = 2\hat{i} - 2\hat{j} + \hat{k}$  and  $\vec{B} = \hat{i} - 2\hat{j} + 2\hat{k}$ . (07 Marks)  
 b. If  $\vec{A} = \hat{i} - 2\hat{j} + 3\hat{k}$ ,  $\vec{B} = -\hat{i} + 2\hat{j} + \hat{k}$  and  $\vec{C} = 3\hat{i} + \hat{j}$ , find the value of p such that  $\vec{A} - p\vec{B}$  is perpendicular to  $\vec{C}$ . (06 Marks)  
 c. Find  $\vec{a} \cdot (\vec{b} \times \vec{c})$ ,  $\vec{b} \times (\vec{a} \times \vec{c})$  and  $\vec{c} \cdot (\vec{a} \times \vec{b})$  where  $\vec{a} = \hat{i} + \hat{j} - \hat{k}$ ,  $\vec{b} = 2\hat{i} - \hat{j} + 2\hat{k}$ ,  $\vec{c} = 3\hat{i} - \hat{j} - \hat{k}$ . (07 Marks)
  
3. a. Obtain the Maclaurin's series expansion of  $\log(\sec x)$  upto the terms containing  $x^6$ . (07 Marks)  
 b. If  $u = \tan^{-1}\left(\frac{x^3 + y^3}{x + y}\right)$  then using Euler's theorem, prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$ . (06 Marks)  
 c. If  $u = f(x - y, y - z, z - x)$ , prove that  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$ . (07 Marks)
  
4. a. Obtain the Maclaurin's series expansion of the function  $\sqrt{1 + \sin 2x}$  upto  $x^4$ . (07 Marks)  
 b. If  $u = e^{\frac{x^2 y^2}{x + y}}$ , prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3u \log u$  using Euler's theorem. (06 Marks)  
 c. If  $u = \frac{yz}{x}$ ,  $v = \frac{zx}{y}$ ,  $w = \frac{xy}{z}$  then show that  $\frac{\partial(u, v, w)}{\partial(x, y, z)} = 4$  (07 Marks)
  
5. a. A particle moves along a curve  $x = 3t^2$ ,  $y = t^3 - 4t$ ,  $z = 3t + 4$  where t is the time variable. Determine the components of velocity and acceleration vectors at  $t = 2$  in the direction  $\hat{i} - 2\hat{j} + 2\hat{k}$ . (07 Marks)  
 b. Find the unit normal vector to the surface  $xy^3z^2 = 4$  at the point  $(-1, -1, 2)$ . (06 Marks)  
 c. Show that the vector field  $\vec{F} = (2x + yz)\hat{i} + (4y + zx)\hat{j} - (6z - xy)\hat{k}$  is irrotational. Also find  $\phi$  such that  $\vec{F} = \nabla\phi$ . (07 Marks)

- 6 a. Find  $\text{div } \vec{F}$  and  $\text{Curl } \vec{F}$ , where  $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$ . (07 Marks)
- b. If  $\vec{F} = (3x^2y - z)\hat{i} + (xz^3 + y^4)\hat{j} - 2x^3z^2\hat{k}$  then find  $\nabla \cdot \vec{F}$ ,  $\nabla \times \vec{F}$  and  $\nabla \cdot (\nabla \times \vec{F})$  at  $(2, -1, 0)$ . (06 Marks)
- c. Determine the constant 'a' such that the vector  $(2x + 3y)\hat{i} + (ay - 3z)\hat{j} + (6x - 12z)\hat{k}$  is Solenoidal. (07 Marks)
- 7 a. Obtain a reduction formula for  $\int_0^{\pi/2} \cos^n x dx$  ( $n > 0$ ). (07 Marks)
- b. Evaluate  $\int_0^a x^4 \sqrt{a^2 - x^2} dx$ . (06 Marks)
- c. Evaluate  $\int_1^5 \int_1^{x^2} x(x^2 + y^2) dx dy$ . (07 Marks)
- 8 a. Obtain a reduction formula for  $\int_0^{\pi/2} \sin^n x dx$  ( $n > 0$ ). (07 Marks)
- b. Evaluate  $\int_0^{2a} x^2 \sqrt{2ax - x^2} dx$ . (06 Marks)
- c. Evaluate  $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x + y + z) dy dx dz$ . (07 Marks)
- 9 a. Solve  $(2x^3 - xy^2 - 2y + 3)dx - (x^2y + 2x)dy = 0$ . (07 Marks)
- b. Solve  $\frac{dy}{dx} - y \tan x = y^2 \sec x$ . (06 Marks)
- c. Solve  $3x(x + y^2)dy + (x^3 - 3xy - 2y^3)dx = 0$ . (07 Marks)
- 10 a. Solve  $\frac{dy}{dx} + y \cot x = \sin x$ . (07 Marks)
- b. Solve  $(x + 3y - 4)dx + (3x + 9y - 2)dy = 0$ . (06 Marks)
- c. Solve  $[1 + (x + y) \tan y] \frac{dy}{dx} + 1 = 0$ . (07 Marks)

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