

FACULTY OF ENGINEERING

B.E. (CE/EE/EIE/CSE) (AICTE) IV – Semester (Backlog) Examination, March/April 2021

Subject: Indian Constitution

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Explain the main features of the Government of India Act 1919.
- 2 What is the main purpose behind the formation of the Constituent Assembly?
- 3 How the President of India is elected?
- 4 What is meant by the Urban Government?
- 5 What Fundamental Duties a citizen of India is supposed to fulfill?
- 6 Mention the differences between Directive Principles and the Fundamental Rights.
- 7 Explain the Centre-State Administrative Relations.
- 8 Examine the composition and functions of Inter-State Council.
- 9 Explain the composition and functions of the Finance Commission of India.
- 10 Mention the composition and functions of the Election Commission of India.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 Examine the contribution of the Constituent Assembly in the making of the Indian Constitution.
- 12 Explain the salient features of the Indian Constitution.
- 13 Discuss the powers and functions of the Prime Minister of India.
- 14 Critically analyze the role of the Chief Minister in the administration of the State.
- 15 Explain in detail the various Directive Principles.
- 16 Examine the role of the National Human Rights Commission in safeguarding the rights of the people.
- 17 Write short notes on:
 - a) Indian Councils Act 1909
 - b) Panchayati Raj Institutions
 - c) NITI Aayog
 - d) National Commission for Women.

FACULTY OF ENGINEERING

B.E. (ECE/M/P/AE/I.T) IV-Semester (AICTE) (Backlog) Examination, March/April 2021

Subject : Environmental Science

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Define water logging problem?
- 2 Define environment and write its components.
- 3 What is a food chain?
- 4 What is meant by ecological succession?
- 5 What are the reasons for habitat loss?
- 6 Define species diversity.
- 7 What is soil pollution?
- 8 Differentiate between point and non-point source pollution.
- 9 What are acid rains?
- 10 Describe environmental ethics.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 a) Illustrate with neat sketch, the different methods of recharging ground water resources.
b) Discuss in detail about the energy resources in India.
- 12 a) Explain the functions of producers, consumers and decomposers in an ecosystem with examples.
b) Explain the structure and functions of an ecosystem.
- 13 a) Enumerate and explain the values of biodiversity.
b) Discuss the various methods of conservation of biodiversity.
- 14 a) Explain the process of solid waste management.
b) Describe briefly the issues involved in enforcement of environment legislation.
- 15 a) Discuss about the environmental ethics and resource use.
b) List the gases responsible for global warming. Explain the possible consequences of green house effect.
- 16 a) What is a dam? Compare the merits and demerits of constructing a dam.
b) Explain the energy flow in an ecosystem with the help of a diagram.
- 17 a) Explain the salient features of wildlife protection act.
b) Explain rehabilitation and resettlement.

FACULTY OF ENGINEERING
B.E. 2/4 (EEE) II – Semester (Backlog) Examination, March/April 2021

Subject: Power System - I

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any seven questions.

(7x3=21 Marks)

1. Define average load, maximum demand and plant capacity factor of the power plant.
2. Discuss advantages and disadvantages of low power factor.
3. What are the major components of steam power plants?
4. Write a short note on dam, penstock and spill way of hydro electric power plant.
5. What are the factors considered for selection of site for Nuclear power plant?
6. Compare flat and concentrating type solar collectors.
7. What are the methods of equalizing potential across a string of insulators?
8. List out the advantages of bundled conductors.
9. What is string efficiency? Write the various methods to improve string efficiency.
10. What do you understand by GMR and GMD of a transmission line?

PART – B

Answer any three questions.

(3x18=54 Marks)

11. (a) What is the pumped storage power plant? Explain its working.
 (b) Explain the working of cooling tower and electrostatic precipitator in steam power plant.
12. The average monthly discharge (Q) measured at a site is give below.
 (a) Calculate the average discharge available and
 (b) Plot mass curve

Week	1	2	3	4	5	6	7	8	9	10	11	12
Q (m ³ /Sec)	1800	1900	1350	1200	1300	3000	4100	3500	1500	1300	1100	1000

13. (a) Derive the expression for the most economical power factor that can be achieved by a consumer.
 (b) Explain the different types of tariffs.
14. (a) Draw the typical layout of a gas turbine power plant and explain the main components.
 (b) Draw the typical diagram of pressurized water reactor and explain along with its advantages and disadvantages.
15. (a) Show that the insulation resistance of a cable is inversely proportional to its length.
 (b) What are the methods of equalizing the potential distribution over a string of insulator?
16. (a) What is the need of grading of cables? Explain capacitance grading.
 (b) What are the factors governing the capacitance of a transmission line? Derive an expression for the capacitance of an unsymmetrical transposed 3-phase transmission line.
17. Derive expression for three phase unsymmetrical spaced transmission line inductance.

FACULTY OF ENGINEERING**B.E 2/4 (ECE/Civil/AE/CSE)II-Semester (Backlog) Examination, March / April 2021****Subject: Environmental Studies****Time: 2 Hours****Max Marks: 75****Note: Missing data, if any may be suitably assumed.****PART – A****Note: Answer any Seven Questions****(7x3 = 21Marks)**

- 1) Define water logging and salinity
- 2) What is Desertification.
- 3) Define the term Ecological pyramid
- 4) Distinguish between ecosystem and ecotone
- 5) Mention few values of biodiversity.
- 6) List various Bio Geographic zones in India.
- 7) What is the significance of environmental protection through legislation.
- 8) List out few air pollution control monitoring equipment.
- 9) What do you understand by Environmental Ethics
- 10) List various types of disasters with example.

PART – B**Note: Answer any Three Questions****(3x18 = 54 Marks)**

- 11 a) What are the major causes for conflicts over water? Write any one example.
b) Differentiate between conventional and nonconventional sources of energy.
- 12 a) Explain the structure of an ecosystem
b) Explain Pond Ecosystem.
- 13 a) Explain major threats to biodiversity
b) Discuss about the conservation of biodiversity.
- 14 a) Define Thermal pollution. Explain causes, effects and control measures of thermal pollution
b) Write the salient features of Forest Act.
- 15 a) Discuss about Global warming and ozone layer depletion.
b) Discuss briefly Disaster Management Cycle.
- 16 a) Discuss noise pollution control strategies
b) Write the different methods of water conservation and watershed management.
- 17 Write a short note on the following
 - a) Principle of living is 'To live and Let live.
 - b) Population explosion.
 - c) Endangered and endemic species of India

FACULTY OF ENGINEERING
BE 2/4 (M/P) II-Semester (Backlog) Examination, March/April 2021

Subject: Thermodynamics

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any seven questions.

(7x3=21 Marks)

- 1 Define Microscopic and Macroscopic approach.
- 2 Explain quasi static process.
- 3 Draw P-V & T-S diagram of Carnot cycle and state the processes.
- 4 Define Clausius statement of II Law of thermodynamics.
- 5 PMM1 is a hypothetical machine – Explain.
- 6 Define First law of thermodynamics and write its corollaries.
- 7 Define dryness fraction and represent constant dryness fraction on T-S diagram.
- 8 Define the terms saturation temperature and saturation pressure.
- 9 Draw P-V & T-S diagram of Diesel cycle and name the processes.
- 10 Define mole fraction & mass fraction.

PART- B

Answer any three questions.

(3x18=54 Marks)

- 11 (a) What do you understand by thermo dynamic equilibrium?
 (b) Derive heat flow and work transfer for constant volume (isochoric) process with P-V diagram for non-flow process.
- 12 (a) Define thermometry. Explain various temperature scales?
 (b) Two thermometers one centigrade and other Fahrenheit are immersed in a fluid. After they reach equilibrium with fluid, it is noted that both the thermometers indicate the same numerical value. Find the identical numerical value?
- 13 (a) Prove that for a constant pressure process the heat transfer is equal to change in enthalpy?
 (b) A reversible heat engine receives heat from a reservoir at 700°C and rejects at temperature T_2 °C. A second reversible engine receives heat rejected by the first engine and rejects to a sink at 37°C. Calculate T_2 for equal work output of both the engines. Also calculate efficiency of each engine?
- 14 An air standard Otto cycle is designed to operate with the following data:
 Maximum cycle pressure and temperature: 5 MPa and 2250 K
 Minimum cycle pressure and temperature: 0.1 MPa and 300 K
 Determine the network output per unit mass of working fluid and thermal efficiency.
- 15 Steam at 20 bar and 0.9 dryness fraction expands adiabatically to 15 bar and then throttled till it is just dry. Find using steam tables
 (a) Condition of steam before throttling
 (b) Adiabatic heat drop
 (c) External work done
 (d) increase in entropy per kg of steam during throttling
- 16 (a) Explain Maxwell relations.
 (b) Explain Dalton's law of partial pressure?
- 17 (a) Write about Helmholtz and Gibbs function?
 (b) Define Zeroth law of thermodynamics and give examples?

FACULTY OF ENGINEERING
B.E. 2/4 (IT) II-Semester (Backlog) Examination, March/April / April 2021

Subject : Web Technologies

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any seven questions.

(7x3=21 Marks)

- 1 List the different types of CSS Selectors?
- 2 Differentiate HTTP-GET and POST requests.
- 3 What is XML Processor?
- 4 Explain XML Namespace with an example.
- 5 Define JSP directives with example.
- 6 Explain the Servlet Life cycle methods.
- 7 Explain the structure of WSDL document.
- 8 Define Web Service.
- 9 What is AJAX?
- 10 List the different ASP.NET Web Form Controls.

PART – B

Answer any three questions.

(3x18 = 54 Marks)

- 11 Create a XHTML registration form to accept the details of a student : Name, Address (Street Name, Country and Pincode), Sex (Male/Female), Branch (chosen from a list box) and Courses (Check box). Provide submit and reset buttons on it.
- 12 Design an XML document to store book information in a library. The book details should include 6 book titles, author, price, number of pages. The books should be arranged according to the category.(eg. Computers, electronics)
- 13 a) List the differences between Servlet and JSP.
b) Write a JSP program to find the factorial of a number.
- 14 a) Describe the general structure of SOAP message and explain.
b) Explain the differences between SOAP and REST.
- 15 a) Explain State Management in ASP.Net .
b) List different validation controls that are used in ASP.NET
- 16 a) Write XHTML code to insert image element.
b) Design an XHTML form to include the following elements.
i) Text box ii) 3 checkboxes
iii) 2 radio buttons iv) reset and submit buttons
- 17 Write short note on
a) XML parsers
b) Session tracking
c) UDDI

FACULTY OF ENGINEERING
B.E. (Civil) IV-Semester (Backlog) Examination, March/April 2021

Subject : Numerical Methods

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Derive iterative formula to find the value of $\frac{1}{N}$ using Newton Raphson method.
- 2 Solve the following system by Gauss elimination method

$$\begin{aligned} 5x - 2y + z &= 4 \\ 7x + y - 5z &= 8 \\ 3x + 7y + 4z &= 10 \end{aligned}$$
- 3 Find the missing values in the following table:

x	45	50	55	60	65
y	3.0	-	2.0	-	-2.4

- 4 Write Newton's forward and backward interpolation formulae.
- 5 Evaluate $I = \int_0^2 e^{-x^2} dx$, using Simpson's $\frac{1}{3}$ rule, take $h = 0.5$.
- 6 Use 2-point Gaussian quadrature formula to evaluate $I = \int_0^1 \frac{dx}{1+x}$.
- 7 Using Picard's successive approximation, obtain a solution upto third approximation of the equation $\frac{dy}{dx} = y + x$, $y = 1$ when $x = 0$.
- 8 Solve $y' = x + y$ given that $y(1) = 0$, find $y(1.1)$ by Taylor's method.
- 9 Define one dimensional heat equation and one dimensional wave equation.
- 10 Derive finite difference approximation for the second derivative using central difference approximation.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Using Bisection method find an approximate root of the equation $\sin x = \frac{1}{x}$ in the interval (1, 1.5). Compute the approximations upto 5th stage.
- (b) Apply Gauss-Seidel iteration method to solve the following system.

$$\begin{aligned} 20x + y - 2z &= 17 \\ 3x + 20y - z &= -18 \\ 2x - 3y + 20z &= 25 \end{aligned}$$
 Take initial approximation $x^{(0)} = y^{(0)} = z^{(0)}$ and iterate three times.

..2..

12 (a) Find all eigen values of the following symmetric matrix by Jacobi's method.

$$A = \begin{bmatrix} 3 & 2 & 2 \\ 2 & 5 & 2 \\ 2 & 2 & 3 \end{bmatrix}$$

(b) Obtain the Newton's divided difference interpolation polynomial for the following data and hence find $f(2)$ value.

x	-1	0	1	3
$f(x)$	2	1	0	-1

13 (a) Find $y'(0)$ and $y''(0)$ for the following table.

x	0	1	2	3	4	5
y	4	8	15	7	6	2

(b) Evaluate the integral $I = \int_{y=1}^{y=1.5} \int_{x=1}^2 \frac{dx dy}{x+y}$ using Simpson's rule with

$$h = 0.5, k = 0.25.$$

14 (a) Give that $\frac{dy}{dx} = x^3 + y$, $y(0) = 2$, $y(0.2) = 2.073$, $y(0.4) = 2.452$ and $y(0.6) = 3.023$.

Find $y(0.8)$ by Milne's predictor – corrector method.

(b) Using Euler's method, find $y(0.2)$, $y(0.4)$ given that $y' = y + e^x$, $y(0) = 0$.

15 Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5$, $t \geq 0$ given that $u(x, 0) = 20$, $u(0, t) = 0$, $u(5, t) = 100$.

Compute 'u' for the time-step with $h = 1$ by Crank-Nicolson method.

16 (a) Using Runge-Kutta method compute $y(0.2)$ from $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$, $h = 0.2$.

(b) Use Lagrange's interpolation formula, find $f(10)$ value for the following data:

x	5	6	9	11
$f(x)$	12	13	14	16

17 Find $\int_0^1 \frac{dx}{1+x}$ using trapezoidal rule with 2, 3, 5, 9 nodes and Romberg integration.

FACULTY OF ENGINEERING
B.E. (EE/Inst./M/P/AE) IV-Semester (Backlog) Examination, March/April 2021

Subject : Engineering Mathematics - IV

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Define Fourier cosine and sine integrals.
- 2 Find Fourier sine transform of $f(x)=e^{-|x|}$.
- 3 Determine the z-transform of $\cos(n + 1)\theta$.
- 4 State and prove Damping rule of Z – Transform.
- 5 Find a root of the equation $x^3 - 4x - 9 = 0$ using Bisection method.
- 6 Find by Taylor series method, the value of y at $x = 0.1, 0.2$ from $\frac{dy}{dx} = x^2 y - 1, y(0) = 1$.
- 7 Derive normal equations to fit the parabola $y = a + bx + cx^2$ using principle of least squares.
- 8 If θ is the angle between the two regression lines, show that

$$\tan \theta = \left(\frac{1 - r^2}{r} \right) \cdot \left(\frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \right).$$

- 9 A random variable x has the following distribution

x	1	2	3	4
$p(x)$	k	$2k$	$3k$	$4k$

Find $P(x \leq 3)$.

- 10 Define Type-I error and Type-II error.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Using Fourier Integral representation. Show that

$$\int_0^{\infty} \frac{\cos x w}{1 + w^2} dw = \frac{\pi}{2} e^{-x}, x \geq 0.$$

- (b) Find Fourier sine transform of $\frac{e^{-ax}}{x}$. Hence find Fourier sine transform of $\frac{1}{x}$.

- 12 (a) Determine $Z\{e^{\alpha n} \cos \beta n\}$.

(b) Using the z-transform, solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$, with $u_0 = 0, u_1 = 1$.

- 13 (a) Find a root of $e^x \sin x = 1$ using Newton-Raphson method.

(b) Given $\frac{dy}{dx} = x + y, y(0) = 1$. Find $y(0.2)$ by Runge-Kutta fourth order method.

..2..

- 14 (a) Find the curve of best fit for the type $y = a e^{bx}$ to the following data by the method of least squares.

x	1	5	7	9	12
y	10	15	12	15	21

- (b) The marks secured by recruits in the selection test (X) and in the proficiency Test (Y) are given below:

Serial No.	1	2	3	4	5	6	7	8	9
X	10	15	12	17	13	16	24	14	22
Y	30	42	45	46	33	34	40	35	39

Calculate the rank correlation coefficient.

- 15 (a) In a sample of 1000 cases, the mean of a certain test is 14 and Standard Deviation is 2.5. Assuming the distribution to be normal, find
- How many students scores between 12 and 15.
 - How many score above 18.
 - How many score below 18.
- (b) The rainfall at a certain place is normally distributed with mean 45cm. The rainfall during the last five years are 48cm, 42cm, 40cm, 44 cm, 43cm. Can we conclude that the average rainfall during the last five years is less than the normal rainfall? Test at 5% level of significance.
- 16 (a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
- (b) The two regression equations of the variables x and y are $x = 19.13 - 0.87y$ and $y = 11.64 - 0.50x$. Find the mean of x 's, mean of y 's and coefficient of correlation.
- 17 (a) Give $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$. Find $\sin 52^\circ$, using Newton's forward interpolation formula.
- (b) Perform the first two iterations of Gauss seidal iteration method to solve.
- $$4x - y + z = 4$$
- $$-x + 4y - z = 2$$
- $$x - y + 4z = 4$$

FACULTY OF ENGINEERING
B.E. (ECE) IV-Semester (CBCS)(Backlog) Examination, March/April 2021

Subject : Applied Mathematics

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Define basis of a vector space.
- 2 Is the transformation $T : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ defined by $T(x, y, z) = (|x|, 0)$ a linear transformation?
- 3 Derive Newton-Raphson iterative formula to find the cube root of N , $N > 0$.
- 4 Evaluate $\Delta^3\{(1-x)(1-2x)(1-3x)\}$.
- 5 Derive the formula to find $\frac{dy}{dx}$ using Newton's forward difference interpolation formula.
- 6 Explain Taylor series method for solving the IVP, $y' = f(x, y)$, $y(x_0) = y_0$.
- 7 Show that the least square line passes through the point (\bar{x}, \bar{y}) .
- 8 Prove that the arithmetic mean of the coefficients of regression is greater than the coefficient of correlation.
- 9 What is an objective function in linear programming?
- 10 Define degenerate feasible solution. Give an example.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Define Vector space. Let $V = \{(a, b) / a, b \in \mathbb{R}\}$ and \mathbb{R} be the field of real numbers. Show that with the operations $(a_1, b_1) + (a_2, b_2) = (a_1 + a_2, 0)$ and $c(a_1, b_1) = (ca_1, b_1)$, $V(\mathbb{R})$ is not a vector space.

- (b) Find the matrix of linear transformation $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ define $T \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 2y + z \\ x - 4y \\ 3x \end{pmatrix}$ with respect to the ordered basis $\{(1, 0, 0)^T, (0, 1, 0)^T, (0, 0, 1)^T\}$

- 12 (a) Apply Gauss-Seidal iteration method to solve the system of equations
 $10x_1 + x_2 + x_3 = 6$, $x_1 + 10x_2 + x_3 = 6$, $x_1 + x_2 + 10x_3 = 6$

- (b) Use Lagrange's interpolation formula to find a polynomial of least degree which suits the following data:

x	1	2	3	4
y	-1	-1	1	5

- 13 (a) The population of a city is given in the following table:

Year (x)	1961	1971	1981	1991	2001
Population (y)	40.62	60.80	79.95	103.56	132.65

Find the rate of growth in population in the year 1995.

- (b) Apply Runge-Kutta method of order 4 to find $y(0.1)$ for $y' = \frac{1}{x+y}$, $y(0) = 1$.

..2..

14 (a) Fit a least square polynomial approximation of degree two to the following data:

x	0	1	2	3	4
y	-4	-1	4	11	20

(b) If the two regression line equations are $20x - 9y = 107$, $5y - 4x = 33$ and variance of x is 9, find the mean values of x and y , correlation coefficient and the standard deviation of .

15 Solve the following LPP by Simplex method.

$$\text{Maximize } Z = 30x_1 + 20x_2$$

$$\text{Subject to } -x_1 + x_2 \leq 5, 2x_1 + x_2 \leq 10, x_1 \geq 0 \text{ and } x_2 \geq 0$$

16 (a) Find the rank and nullity of the transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ define by

$$T \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x + y \\ x - y \\ y \end{pmatrix}$$

(b) Perform first four approximations of bisection method to solve the equation $x^4 + 2x^3 - x - 1 = 0$.

17 Find the coefficient of correlation and regression lines to the following data:

x	5	7	8	10	11	13	16
y	33	30	28	20	18	16	9

FACULTY OF ENGINEERING**B.E (I.T) IV-Semester (CBCS) (Backlog) Examination, March/April 2021****Subject: Signals & Systems****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

1. Check whether $x(t) = \cos t$ is even or odd?
2. Sketch folded and shifted unit ramp signal $r(t)$.
3. Determine the signal $\cos(nt)$ is orthogonal or not with $\sin(nt)$ over $(0 \text{ to } 2\pi)$.
4. State the properties of auto correlation.
5. Find the Laplace transform of $f(t) = e^{-3t} u(t)$.
6. Check whether the system $y(t) = n x(t)$ is Time Invariant or not ?
7. Find the Fourier transform of $f(t) = \cos w_c t$.
8. Define Sampling.
9. State initial and final value theorem in Z-transform.
10. Find the Z-transform of $x(n) = \{-2, 4, 5, 7\}$.

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

11. (a) Check whether the system $y(t) = x(t^2)$ are linear or not and Time Invariant or Time variant .
(b) Sketch time shifting, time reversal, amplitude reversal and amplitude scaling for $u(t)$ with functional representation.
12. (a) Obtain the Trigonometric Fourier series for the saw tooth wave .
 $f(t) = At ; 0 < t < 1$
(b) Explain the analogy between vectors and signals.
13. (a) Find the Fourier transform of $f(t) = \text{sgn}(t)$.
(b) Find the step response of the system described by the differential equation
 $d^2y(t) / dt^2 - dy(t) / dt - 12 y(t) = x(t)$. Assume zero initial condition.
14. (a) For the given $x(n) = \{2, 1, 4, 3, 5\}$. Find $x(-n)$, $x(n-2)$, $x(n+3)$, $-x(n)$ and $x(-n-1)$.
(b) Explain sampling operation in detail
15. (a) Find the Z - transform for $x(n) = (1/4)^n u(n) + (1/5)^n u(n)$ and plot its ROC.
(b) Determine the step response for the system described by the difference equation
 $y(n+2) + 5 y(n+1) - 14 y(n) = x(n)$. Assume zero initial condition.
16. (a) Find the inverse Z –transform for $X(Z) = (1+5Z^{-1}) / (1 - 8Z^{-1} - 48Z^{-2})$, if ROC $|z| > 12$.
(b) State and prove any three properties of DTFT.
17. (a) Differentiate Laplace transform and Z transform.
(b) Write a note on causal system.
(c) Write notes on LTI system.

FACULTY OF ENGINEERING
B.E. (CSE) IV-Semester (CBCS)(Backlog) Examination, March / April 2021

Subject: Mathematics & Statistics

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Write the sufficient conditions for the existence of Laplace Transform.
- 2 Find $L\{t \cos 2t\}$.
- 3 Define Fourier cosine and sine integral.
- 4 Find the Fourier transform of $f(t) = \begin{cases} a, & -l < t < l \\ 0, & \text{otherwise} \end{cases}$, here $a > 0$.
- 5 State division algorithm.
- 6 Convert $(6105)_7$ to decimal notation.
- 7 Define Type – I and Type – II error.
- 8 Find the mean of the Binomial distribution.
- 9 Write normal equations for the second degree polynomial $y = a + bx + cx^2$.
- 10 If θ is the angle between the two regression lines, show that $\tan \theta = \left(\frac{1-r^2}{r} \right) \left(\frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \right)$.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 a) Find $L^{-1} \left\{ \frac{1}{(s^2 + w^2)^2} \right\}$ using convolution theorem.
- b) Solve the initial value problem $y'' - 5y' + 4y = e^{2t}$, $y(0) = \frac{19}{12}$, $y'(0) = \frac{8}{3}$.
- 12 a) Find the Fourier transform of the function $f(t) = e^{-a|t|}$, $-\infty < t < \infty$, $a > 0$.
- b) Find the Fourier sine transform of $\frac{e^{-ax}}{x}$.
- 13 a) Find the gcd(56, 72) and also find the integers x and y such that $\text{gcd}(56, 72) = 56x + 72y$.
- b) Solve the linear congruence $36x \equiv 8 \pmod{102}$.
- 14 a) In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and standard deviation of 60 hours. Estimate the number of bulbs to burn for (i) more than 2150 hours (ii) less than 1950 hours.
- b) Two random samples of sizes 9 and 7 gave the sum of squares of deviations from their respective means as 175 and 95 respectively. Can they be regarded as drawn from normal populations with the same variance?

..2..

15 a) Fit a straight line $y = a + b x$ to the following data

x	50	70	100	120
y	12	15	21	25

b) Calculate the rank correlation coefficient from the following data showing ranks of 10 students in two subjects.

Maths	3	8	9	2	7	10	4	6	1	5
physics	5	9	10	1	8	7	3	4	2	6

16 a) Find $L \left\{ \frac{\cos at - \cos bt}{t} \right\}$.b) Find Fourier transform of $f(x) = \begin{cases} 1 & \text{for } |x| < 1 \\ 0 & \text{for } |x| > 1 \end{cases}$.

17 a) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction.

b) An irregular six faced dice is thrown 12 times. The expectation that it will give six even numbers is twice the expectation that it will give 5 even numbers. If 1000 sets, each of exactly 12 trials are made, how many sets are expected not to give any even number?
