Code No. 11604 / A / S

FAC2ULTY OF ENGINEERING

B.E. I – Semester (Suppl) Examination, May / June 2019

Subject: Mathematics – I

Time: 3 Hours **Max.Marks: 70**

Note: Answer all questions form Part-A and any five questions from Part-B

PART – A (10x2 = 20 Marks)

1 Determine the nature of the series $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2+1}$.

2 Determine the nature of the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$.

3 Find the coefficient of x^2 in the expansion of $f(x) = e^x \sin x$.

4 Find the radius of curvature for the curve $y^2 = x^3 + 8$ at (-2, 0).

5 Show that the limit $\lim_{(x,y)\to(0,0)} \frac{x^3 y}{x^6 + y^2}$ .does not exist.

6 If $xy + y^2 - 3x - 3 = 0$, then evaluate $\frac{dy}{dx}$ at (-1, 1).

7 Evaluate $\int_0^{\pi} \int_0^1 x \cos xy \, dy \, dx$.

8 Evaluate $\int_0^{\frac{\pi}{6}} \int_0^1 \int_{-2}^3 y \sin z \, dx \, dy \, dz$.

9 If $\vec{a}$ is a constant vector and $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ then evaluate Curl ($\vec{a} \times \vec{r}$).

10 Evaluate $\int_C \vec{v}.d\vec{r}$ where $\vec{v} = x\hat{i} + y\hat{j} + z\hat{k}$ and C is the line segment from A(1, 2, 2) to B (3, 6, 6).

PART – B (5x10 = 50 Marks)

11 a) Discuss the convergence of the series $1 + \frac{1!}{2}x + \frac{2!}{3^2}x^2 + \frac{3!}{4^3}x^3 + \ldots \ldots$ 5

b) Determine the nature of the series $\sum_{n=1}^{\infty} \left(\frac{n}{3n+1}\right)^n$. 5

12 a) State and prove Lagrange's mean value theorem. 5

b) Find the envelope of the family of curves $\frac{a^2}{x}\cos^{-} - \frac{b^2}{y}\sin^{-} = c$, where $^{-}$ being the parameter. 5

13 a) Explain the method of Lagrange multipliers. Find the minimum value of the function $f(x, y) = xy + \frac{27}{x} + \frac{27}{y}$. 5

b) Find the first three terms of the Taylor series of the function $f(x,y) = e^x \cos y$ around O(0,0). 5

14 Evaluate $\int_{y=0}^{1} \int_{x=0}^{y+4} \frac{2y+1}{x+1}\, dx$ by changing the order of integration. 10

15 Verify Gauss divergence theorem for $\bar{V} = 2xy\hat{i} + 6yz\hat{j} + 3zx\hat{k}$ and D is the region bounded by the coordinate planes and the plane x + y + z = 2. 10

16 a) Find the extreme values of $f(x,y) = x^2 + 3y^2 + 2y$ on the unit disk $x^2 + y^2 = 1$. 5

b) Find the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. 5

17 a) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} (x^2 + y^2)\, dy\, dx$ by changing to polar coordinates. 5

b) Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$, $z+3 = x^2 + y^2$ at (-2, 1, 2). 5

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Code No. 11427/CBCS

FACULTY OF ENGINEERING

B.E. (Civil) IV - Semester (CBCS) (Main) Examination, May/June 2019

Subject : Numerical Methods

Time : 3 Hours **Max. Marks: 70**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART-A (20 Marks

1 Define direct methods and iterative methods. (2)

2 Explain Bisection method. (2)

3 State Lagrange's interpolation formula. (2)

4 Find the cubic polynomial which takes the following values (2)

x	0	1	2	3
$f(x)$	1	2	1	10

5 Evaluate $\int_0^6 \frac{1}{1+x^2}\,dx$ by using Simpson's 1/3 rule. (2)

6 Use Trapezoidal rule to evaluate $\int_0^1 x^3 dx$ considering five subintervals. (2)

7 Write the formula for 4th order Runge-Kutta method to find y_1 for $\frac{dy}{dx} = f(x, y)$ with $y(x_0) = y_0$. (2)

8 Write the iterative formula of Euler's method for solving $\frac{dy}{dx} = f(x, y)$ with $y(x_0) = y_0$. (2)

9 Classify the equation $\frac{\partial^2 u}{\partial x^2} + 3\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$. (2)

10 Write the finite difference form of $\frac{\partial^2 u}{\partial x \partial y}$. (2)

PART- B (50 Marks)

11 (a) Apply Newton Raphson Method to find an approximate root of the equation $e^x - 3x = 0$ that lies between 0 and 1. (5)

(b) Apply LU decomposition method to solve the equations (5)

$3x + 2y + 7z = 4, \quad 2x + 3y + z = 5, \quad 3x + 4y + z = 7$

12 Apply Guass Seidal iteration method to solve the equations

20x+y-2z=17, 3x + 20y-z = -18, 2x – 3y + 20z = 25 (10)

13 (a) Using Jacobi's Method, find all the eigen values and the eigen vectors of the matrix

$$\begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix} .$$ (5)

(b) Using Newton's divided difference formula, evaluate f(8) given (5)

x	4	5	7	10	11	13
$f(x)$	48	100	294	900	1210	2028

14. (a) Use Romberg's method to compute $\int_0^1 \frac{1}{1+x^2}\,dx$ correct to four decimal places. (5)

(b) Using three point Guassian quadrature formula, evaluate $\int_0^1 \frac{1}{1+x}\,dx$. (5)

15.(a) For the following values of x and y, find the first derivative at $x = 0$. (5)

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

(b) Using Trapezoidal rule evaluate $\int_0^1 \int_0^1 xe^y\,dxdy\ (h = k = 0.5)$ (5)

16. Using Milne's predictor-corrector method, obtain the solution of the equation $\frac{dy}{dx} = x - y^2$ at $x = 0.8$ given that y(0)=0, y(0.2)=0.02, y(0.4)=0.0795, y(0.6)=0.1762. (10)

17. Find the values of u(x, t) satisfying the equation $\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}$ and the boundary conditions u(x,0) = 0 = u(8, t) and u(x,0) = $4x - \frac{1}{2}x^2$ at the points x = i ; i = 0, 1, 2, …. 7 and $t = \frac{1}{8}j$; $j = 0,1,2,...5$ using finite difference approximations. (10)

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Code No. 11434 / CBCS

FACULTY OF ENGINEERING

B.E. (EE/Inst/M/P/AE) IV – Semester (CBCS) (Main & Backlog) Examination, May / June 2019

Subject: Engineering Mathematics – IV

Time: 3 Hours **Max.Marks: 70**

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (20 Marks)

1 If F(s) is the Fourier transform of f(x), show that the Fourier transform of f(x-a) is $e^{isa}F(s)$. (2)

2 Find the finite Fourier sine transform of f(x) = x in [0, ®]. (2)

3 Obtain the Z transform of the sequence $\left\{\frac{2^{-n}}{n!}\right\}$ (2)

4 If $Z\{f_n\} = \frac{3z^3+5z^2-7z+1}{(z+2)^2(z-1)}$, find $\lim_{n\to\infty} f_n$. (2)

5 Solve x + 2y + z = 0, 2x + 2y + 3z = 3 and –x – 3y = 2 by Gauss elimination method. (2)

6 Write the impressions for $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ using Newton's backward interpolation formula. (2)

7 Show that $r = \frac{\pm^2_{x+y} - \pm^2_x - \pm^2_y}{2\pm_x \pm_y}$ (2)

8 If the two lines of regression are 20x – 9y – 107 = 0 and 4x – 5y + 33 = 0, find the mean values $\bar{x}$ and $\bar{y}$. (2)

9 If P(A) = $\frac{1}{3}$, P(B) = $\frac{1}{4}$ and P(A ∪ B) = $\frac{1}{2}$, find P(A/$\bar{B}$). (2)

10 Define normal distribution. (2)

PART – B (50 Marks)

11 a) Using the Fourier sine integral, show that $\int_o^\infty \frac{a \sin ax}{1+a^2}da = \frac{®}{2}e^{-x}$, x > 0. 5

b) Find the Fourier cosine transform of f(x) = $\begin{bmatrix} e^{2x}-e^{-2x}, & 1 \le x \le 2 \\ 0 & otherwise \end{bmatrix}$. 5

12 a) Find Z {n cos n¯ } 5

b) Solve the difference equation $y_{n+2} - 7y_{n+1} + 12Y_n = 0$, $y_o = 1$, $y_1 = 2$ using Z – transforms. 5

13 a) Derive the Newton-Raphson iterative formula to find $3\sqrt{N}$, **N** > 0 and hence find $3\sqrt{18}$. ' 5

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b) Find the unique polynomial P(x) of degree 2 such that P(1) = 1, P(3) = 27, P(4) = 64 using Lagrange's interpolation formula. 5

14 a) Find the least square line of the form y = a + bx to the following data 5

x:	-2	-1	0	1
y:	6	3	2	2

b) Obtain the rank correlation coefficient for the following data. 5

x:	68	64	75	50	64	80	75	40	55	64
y:	62	58	68	45	81	60	68	49	50	70

15 a) Find the mean and variance of uniform distribution. 5

b) Two independent samples of sizes 8 and 7 respectively had the following values of the variable. 5

Sample 1	9	11	13	11	15	9	12	14
Sample 2	10	12	10	14	9	8	10	

Is the difference between the mans of the samples significant? Test at 5% level of significance (Given $t_{0.05}(13) = 2.16$.

16 a) Find the Fourier transform of f(x) = $e^{\frac{-x^2}{2}}$. 5

b) If $Z\{f_n\} = \left(\frac{z}{z-1}\right)^3$, find f_n by convolution theorem. 5

17 a) Find the approximate value of y(2.1) for $y' = 2+\sqrt{xy}$, y(2) = 1 using Runge-Kutta method of order 4 with h = 0.1. 5

b) Three bags contain 6 red, 4 black; 4 red, 6 black; 5 red, 5 black balls respectively. One of the bags is selected at random and a ball is drawn from it. If the ball drawn is red, find the probability that it is drawn from the first bag. 5

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Code No. 11443 / CBCS

FACULTY OF ENGINEERING

B.E. (ECE) IV - Semester (CBCS) (Main & Backlog) Examination, May / June 2019

Subject : Applied Mathematics

Time : 3 Hours **Max. Marks: 70**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (20 Marks)

1 Define subspace. Give an example. (2)

2 Let T be a transformation from $\mathbf{R}^3$ into R defined by $T(x, y, z) = x^2 + y^2 + z^2$. Show that T is not a linear transformation. (2)

3 Perform two iterations of bisection method to find the smallest positive root of $x^3 - 5x + 1 = 0$. (2)

4 Find the Lagrange interpolating polynomial that fits the following data values. (2)

x	2.5	3.5
f(x)	6	8

5 State Newton's forward and backward interpolation formulae. (2)

6 Write Runge-Kutta method of order 4 formula. (2)

7 Find the normal equations to fit a line of the form y = a + bx to the following data: (2)

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

8 If the two regression coefficients are 0.8 and 0.2, find r. (2)

9 What do you mean by a feasible solution of a linear programming problem? (2)

10 Write the normal form of the following LPP. (2)

Maximize $f = 40x_1 + 88x_2$

Subject to $2x_1 + 8x_2 \leq 60$

$5x_1 + 2x_2 \leq 60$,

$x_1 \geq 0,\ x_2 \geq 0$

PART – B (50 Marks)

11 (a) Discuss whether the set V of all rational numbers with the usual addition and scalar multiplication is a vector space. If not, state which of the properties are not satisfied. (5)

(b) Let T : $\mathbf{R}^3$ ì $\mathbf{R}^2$ be a linear transformation defined by $T\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} y + z \\ y - z \end{pmatrix}$. Determine the matrix of the transformation T with respect to the ordered basis $\{(1, 0, 0)^T, (0, 1, 0)^T, (0, 0, 1)^T\}$ in $\mathbf{R}^3$ and $\{(1, 0)^T, (0, T)^T\}$ in $\mathbf{R}^2$. (5)

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12 (a) Solve the system of equation
$4x + y + 2z = -1$, $x + 5y + z = 5$, $2x + y + 4z = 3$
using Gauss-Seidel iteration method. (5)

(b) Determine the interpolation polynomial for the following data: (5)

x	– 3	– 2	– 1	0	1	2
f(x)	– 2	– 4	– 4	– 2	2	8

13 Using Milne's predictor – corrector method, find y(0.8) for the initial value problem $y' = x^2 + y^2$, $y(0) = 1$ with $h = 0.2$. Calculate the required initial values using Euler's method. (10)

14 (a) Find the values of a, b, c such that $y = a + bx + cx^2$ is the best fit to the following data: (5)

x	0	1	2	3	4
y	1	0	3	10	21

(b) Calculate the rank correlation coefficient from the data given below: (5)

x	67	68	64	68	72	70	69	70
y	65	66	67	67	68	69	71	73

15 Solve the following LPP by simplex method: (10)
Minimize $f = x_1 – 3x_2 + 2x_3$
Subject to $3x_1 – x_2 + 2x_3 \geq 7$
$– 2x_1 + 4x_2 + \leq 12$
$– 4x_1 + 3x_2 + 8x_3 \leq 10$
$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$

16 (a) Determine whether (4, 3, 10) is a linear combination of u=(1, 2, -1), v(2, 3, 4,) and w = (1, 5, - 3). (5)

(b) Derive Newton-Raphson iterative formula to find $\frac{1}{N}$, $N \neq 0$ and hence find $\frac{1}{20}$. (5)

17 Find the coefficient of correlation and the two regression lines to the following data: (10)

x	6	2	10	4	8
y	9	11	5	8	7

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Code No. 11457/CBCS

FACULTY OF ENGINEERING

BE (CSE) IV- Semester (CBCS) (Main & Backlog) Examination, May / June 2019

Subject : Mathematics and Statistics

Time: 3 Hours **Max. Marks: 70**

Note: Answer all questions from Part-A and any Five questions from Part-B.

Part-A (20 Marks)

1 If $\frac{dy}{dx}$ =2x + y, y(o)=2 then evaluate y (0.3) by using Euler's method.

2 Find an approximate root of x^3 - 2x -5 = 0 using bisection method.

3 Find the finite Fourier cosine transform of f(x) = $(1-\frac{x}{®})^2$, $0 < x <$ ®

4 Find the Fourier sine transform of f(x) = $\frac{e^{-ax}}{x}$

5 If gcd (a,b) = 1 then find the gcd (a+b, $a^2 + b^2$).

6 Find the remainder when 3^{50} is divided by 5

7 A random variable X has the probability density function f(x) = 6x (1-x), $o \le x \le 1$ then find the mean.

8 Define uniform distribution and find its mean.

9 Using the method of least squares, fit a straight line of the form y = a+bx to the following data

X	-2	2	4	6
Y	-1	9	14	19

10 Show that the arithmetic mean of the regression coefficients is greater than the correlation coefficient

Part-B (50 Marks)

11. a) Solve the following system of equations by using Gauss – Seidel method

$5x_1+2x_2 + 2x_3 = 27$

$x_1 + 3x_2 + x_3 = 17$

$x_1 + 2x_2 + 6x_3 = 23$

b) Construct the backward difference table and hence find the corresponding inter polating polynomial for the following data

x	0	1	2	3	4	5
F(x)	-3	0	5	18	45	92

12 a) Find the Fourier cosine transform of the function f(x) = x^{m-1}, m>0

b) Find the Fourier transform of the function.

f (x) = $\begin{cases} a^2 - x^2, & |x| \le a \\ o, & |x| \le a \end{cases}$

hence evaluate $\int_0^\infty \frac{\sin(x) - x\cos(x)}{x^3} dx$.

13 a) Find the solutions of the following linear congruences, if any (6)
(i) $18x \equiv 30 \pmod{42}$
(ii) $36x \equiv 8 \pmod{102}$.

b) If p is a prime then show that $(p-1)! + 1 \equiv 0 \pmod{p}$. (4)

14 a) Let X be a random variable which follows a normal distribution with mean 64 and standard deviation 3. Then find
(i) $P(6 \le X \le 70)$ (ii) $P(X \ge 67)$ (iii) $P(X \le 61)$
$[P(0 \le z \le 1) = 0.3413, P(o \le z \le 2) = 0.4772]$ (5)

b) The nine items of a sample have the following values : 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these values differ significantly from the assumed mean 47.5? (5)
(The table value of t for 8 degrees of freedom at 5% level of significance is 2.31)

15 a) The ranks obtained by seven (7) students in Mathematics and Physics are given below. (5)

Mathematics	2	1	4	3	5	7	6
Physics	1	3	2	4	5	6	7

Evaluate the spearman's rank correlation coefficient

b) Using the method of least squares, fit a curve of the form $y = a+bx+cx^2$ to the following data (5)

x	-2	-1	1	3	5
y	-3	3	21	47	81

16 a) If $y^1 = x^2 - y$, $y(0) = 1$ y1 = x2-y, y (o)=1 then evaluate y (0.1) by using Runge – Kutta fourth order method. (5)

b) Find $\frac{dy}{dx}$ at x = 1 from the following data.

x	1	2	3	4	5
y	13	7	3	1	1

17 a) State Fermat's theorem and hence find the units digit of $3^{100.}$ (5)

b) A bag contains one white and 9 black balls. P who speaks the truth is 5 cases out of six says that a white ball was drawn from the bag. What is the probability that a white ball was really drawn from the bag? (5)

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Code No: 11463/CBCS

FACULTY OF ENGINEERING

B.E IV – Semester (CBCS) (I.T) (Main & Backlog) Examination, May/June 2019

Subject: Signals and Systems

Time: 3 Hours **Max Marks: 70**

Note: Answer all questions from Part-A & Any Five Questions from Part-B

PART – A (20 Marks)

1. Sketch the following signal x(t) $= r(t+2) - 2r(t) + 2r(t-4)$ 2
2. Give the expression for expression Mean Square Error 2
3. Check whether the following system is Time Invariant or not y(n) $= x(n) - nx(n-1)$ 2
4. Find the Fourier transform of f(t) = f(t-2) + f(t+2) 2
5. Determine the Discrete Fourier series coefficients of

   x(n) = 1+ sin($\frac{2®}{N}$)n 2
6. Define System Bandwidth and Signal Bandwidth. 2
7. Find the Initial value

   $(s) = \frac{s+10}{s^2+3s+2}$ 2
8. Evaluate DTFT of x(n) $= u(n) - u(n-5)$. 2
9. Find the Laplace transform of e^{-6tu}(t) and plot its ROC. 2
10. Using the properties of Z-transform, determine $x_2(n) = x_1(n+2)$ where $x_1(n) = (1/2)^n$. 2

PART – B (50 Marks)

11. a) Examine whether the following signals are periodic or not 4

    i) sin π t u(t) ii) j e^{j6t}

    b) Check whether the following system is linear or not 6

    i) $\frac{dy(t)}{dt} + y(t) = x(t)\frac{dx(t)}{dt}$

    ii) $y(t) = 2x(t^2)$

    iii) $y(t) = e^{x(t)}$
12. Find the Exponential Fourier series of a half wave rectified sine function. 10
13. a) Find the Fourier transform of a Triangular pulse function. 7

    b) What is a filter and how filters are classified. 3
14. A system is described by the differential equation 10

    $\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t) = x(t)$

Contd..2

i) Find the impulse response of the system

ii) For the initial conditions

$\frac{dy(0^-)}{dt} = 2$

and $y(0^-) = 1$ *and* input x(t) = u(t) , find the free and forced response of the system

15. State and Prove Sampling theorem for band limited signals 10

16. a) Determine the Z-transform and ROC of

$x(n) = (0.5)^n\, u(-n) - 2^n\, u(-n-1)$. Also indicate the pole –zero locations. 6

b) State and prove the following properties of DTFT

i) Frequency shifting property

ii) Time reversal property 4

17. Write short notes on

a) Othogonality of signals 3

b) Fourier transform of any general Periodic signal. 4

c) ROC of Z- Transform 3

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Code No. 11083/BL

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I – Semester (Backlog) Examination, May/June 2019

Subject: Fluid Mechanics – II

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions form Part-A and any five questions from Part-B. Missing data, if any, may suitably be assumed.

PART – A (25 Marks)

1 Distinguish between a pipe flow and an open channel flow. [2]
2 Define the various types of flows in an open channel. [3]
3 Explain the significance of Froude's number. [2]
4 If a hydraulic jump occurs at a point where the upstream depth is 0.25m, what would be the depth after the jump, if the discharge per unit width q = 0.625 m^3/s per metre width. [3]
5 What is water hammer? [2]
6 Determine the drag for a semi-tubular cylinder of 65mm diameter, 8m length with concave side upstream. Drag coefficient is 2.3. [3]
7 What is similitude or similarity? Explain the different types of similarities. [3]
8 What is meant by impact of jet? [2]
9 Write the uses of draft tubes. [3]
10 Define the specific speed and minimum starting speed of a centrifugal pump. [2]

PART – B (5x10 = 50 Marks)

11 a) State the conditions under which the rectangular section of an open channel will be most economical. Derive these conditions. [5]

b) Find the discharge through a trapezoidal channel of width 8m and side slopes 1 hor. to 3 ver. The depth of flow of water is 2.4m and Chezy's constant value is 50. The slope of channel bed is 1 in 4000. [5]

12 a) Explain the specific energy curve with the help of a figure. Also derive the expression for critical depth. [5]

b) A rectangular channel 7.5m wide has a uniform depth of flow 2m and has a bed slope of 1 in 3000. Due to weir construction at the downstream end of channel, the water surface at a section is raised by 0.75m. Determine the water surface slope with respect to the horizontal at this section. Take n=0.02. [5]

13 a) Derive dynamic equation of gradually varying flow with usual notations. State the assumptions. [5]

b) The loss of energy head in a hydraulic jump is 4.25m. The Froude number just before the jump is 7.5. Find: [5]
i) The discharge per unit width of the channel.
ii) The depths before and after the hydraulic jump.
iii) The Froude number after the jump.
iv) Percentage loss of energy due to jump.
v) Length of the jump.

14 a) What is a boundary layer? Explain the formation of boundary layer along a flat plate with figure. [5]

b) Derive an expression for pressure rise due to sudden valve closure. [5]

15 a) Explain different types of models and their scale ratios. [5]

b) In a geometrically similar model of spillway, the discharge per metre length is 1/6 m^3/s. If the scale of the model is 1/36, find the discharge per metre run of the prototype. [5]

16 a) Briefly explain about the working principle of impulse turbine with a neat sketch. [5]

b) A jet of water of diameter 10cm strikes a flat plate normally with a velocity of 15m/s. The plate is moving with a velocity of 6m/s in the direction of the jet and away from the jet. Find: [5]
   i) The force exerted by the jet on the plate
   ii) Work done per second by the jet on the plate.

17 Write short notes on the following. [10]
   a) Drag and its classification
   b) Distorted and undistorted models.
   c) Procedure for Buckingham's ∏ theorem.

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Code No. 11089/BL

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) I - Semester (Backlog) Examination, May / June 2019

Subject : Electrical Machinery – II

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (25 Marks)

1 Why are tappings provided in transformers? Give reasons for tappings being generally provided on high voltage side of the transformer ?
2 Compare & contrast the between a three phase transformer bank and a three phase transformer unit.
3 Why Polarity test is mandatory for connecting the transformers in parallel?
4 List the different methods of cooling of transformers.
5 Why is an induction motor called a generalized transformer? In What respect is the operation of induction motor different than that of transformer?
6 Under what conditions does the Induction motor operates as Induction Generator ?
7 Why are starters needed for Induction Motors ?
8 Why V/f has to be maintained constant for frequency control method of Induction motor ?
9 What are the probable causes for the rotor circuit unbalance in a 3 phase Induction motor ?
10 Why the Power factor of an Induction motor low on No Load condition

PART – B (50 Marks)

11 (a) Explain with the help of connection & phasor diagrams how a scott connection is used to obtain two Phase supply from three phase supply.
(b) A 2200/230V,20KVA two winding transformer has core loss of 125W& F.L Copper losses of 300W. It is connected as a step up autotransformer with LV winding additively in series with HV winding .
Calculate a) Voltage ratings of primary & secondary b) Voltage ratio
c) KVA rating d) Efficiency at F.L

12 (a) Write short notes on maintenance of transformers.
(b) The following tests were obtained for a 20 KVA 50 HZ 2400V/240V 1 phase distribution Transformer:

OC test(LV): 240V 1.066A 126.6W

SC test(HV) : 57.5V 8.34A 284W

When the transformer is operated as step down transformer with the output voltage equal to 240V,supplying a load at UPF determine the maximum efficiency & UPF load at which it occurs. Determine the p.f of the rated load supplied at 240V such that the terminal voltage observed on reducing the load to zero is still 240V

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13 A 5H.P 200V 3 phase 4pole 50Hz star connected I.M has the following test results :

NO LOAD TEST:	200V	5A	350W
BLOCKED ROTOR TEST:	100V	26A	1700W

Calculate the line current & p.f ,maximum torque ,maximum efficiency by drawing circle diagram .The rotor copper loss at standstill is half the total copper losses

14 (a) Explain the speed control of 3 phase induction motor by scherbius method of slip power recovery scheme

(b) A 4pole 3 phase 50 Hz SRIM has a rotor resistance of 0.25Ω & reactance of 2Ω per phase at standstill condition .It is running at 1455 rpm speed .Calculate the value of external resistance per phase required in the circuit to reduce the speed by 17% .Assume the load torque to be constant

15 (a) A 3-phase induction motor is connected to an unbalanced supply voltage. Under the condition, derive its equivalent circuit and show that the net electromagnetic torque is reduced.

(b) Explain the effect of single phasing on Y/Δconnected transformer with neat circuit diagrams .

16 (a) Write short notes on Double cage induction motor.

(b) A 3 phase 50Hz transformer has a delta connected primary & star connected secondary the line voltage being 22,000V & 400V respectively .The secondary has a star connected balanced load at 0.8 P.f lag .The line currents on the primary side is 5A . Determine the current in primary & in secondary line . What is the output of transformer in KW ?

17 (a) The full load slip of a 400V 3 phase cage I.M is 3.5% & with blocked rotor full load current is Circulated when 92V is applied between the lines . Find the necessary tapping on an autotransformer to limit the starting current to twice the full load current of the motor . Also Determine the starting torque in terms of full load torque

(b) A 3 phase 660V/415V 2000KVA transformer has a per unit resistance of 0.02 & per unit leakage reactance of 0.1. Calculate the copper loss & regulation at full load at 0.8 p.f lagging.

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Code No. 11095/BL

FACULTY OF ENGINEERING

B.E. 3/4 (Inst) I – Semester (Backlog) Examination, May / June 2019

Subject: Signal & Systems

Time: 3 hours **Max. Marks: 75**

Note*: Answer All Questions from* ***Part – A*** *and any* ***five*** *questions from* ***Part – B****.*

PART – A (25 Marks)

1 Determine Linearity and causality of the following system. 3

$$2\frac{dy(t)}{dt}+5y(t)=x^2(t)$$

2 Determine the power of the signal $x(t)=5\cos\left(10t+\frac{®}{4}\right)$ 2

3 Prove that signals $\sin(m\mu_0 t)$ and $\sin(n\mu_0 t)$ are mutually orthogonal. 3

4 Give necessary and sufficient condition for existence for Fourier series. 2

5 Prove Time Shifting Property of Fourier Transform. 3

6 Determine the Fourier Transform of $x(t)=e^{-2t}u(t)$. 2

7 Define Laplace Transform. 2

8 Find Laplace transform of signal $x(t)=e^{-j\mu t}u(t)$. 3

9 Find Z-transform of $x(n)=(-1)^n.3^{-n}.u(n)$ 3

10 Define Zero Order Hold. 2

PART – B (5x10 = 50 Marks)

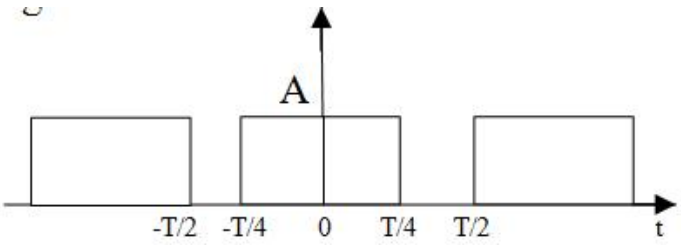
11 a) Explain classification of signals with examples. 5

b) Determine whether the following systems are stable and causal. 5

i) $h(n)=3^n u(-n)$

ii) $h(t)=(2+e^{-3t})u(t)$

12 Find the Trigonometric Fourier Series of the following waveform. 10



13 a) Prove the Time domain Differentiation and Integration properties of Fourier Transform. 6

b) Find Fourier transform of a Gate function. 4

14 a) Determine the initial value $x(0^+)$ for the following Laplace transform. 6

$$X(s) = \frac{4}{s^2 + 3s - 5}$$

b) Determine the Laplace Transform of signal $x(t) = e^{-2t}u(-t) + e^{-3t}u(-t)$. 4

15 a) State five properties of Z-transform. 5

b) Find the Inverse Z-transform of $X(z) = \frac{2z - 7}{z^2 - 5z + 6}; ROC; |z| > 2$ 5

16 a) Consider a stable LTI system characterized by the differential equation 5

$\frac{d^2y(t)}{dt^2} + 8\frac{dy(t)}{dt} + 14y(t) = 4\frac{dx(t)}{dt} + 7x(t)$. Find its transfer function.

b) Find impulse response of the following system described by the difference equation 5

$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$.

17 Write Short notes on: 10

a) Parseval's Theorem

b) Sampling Theorem.

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Code No: 11652/O

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I – Semester (Old) Examination, May/June 2019

Subject: Digital Integrated Circuits & Applications

Time: 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A & any Five questions from Part-B.

PART – A (25 Marks)

1. State the advantages and disadvantages of Totem-pole output. 2M
2. Define prorogation delay and noise margin of a logic gate. 2M
3. Explain CMOS inverter with neat sketch. 3M
4. Write any two advantages and disadvantages of TTL logic. 3M
5. Define setup time and hold time with respect to flip-flops. 2M
6. Write the applications of data selectors. 2M
7. Compare and contrast serial and parallel adder. 3M
8. State the applications of Shift Registers. 3M
9. Write short notes on EEPROM. 3M
10. Draw the internal architecture of a typical PLA. 2M

PART – B (5 x 10 = 50 Marks)

11. a) Explain the working of TTL tri state inverter with its circuit diagram. 5M
    b) Write the characteristics of CMOS logic family. 5M

12. a) What do you mean by dynamic MOS logic? When it is preferred? Explain dynamic N-MOS NAND gate. 6M
    b) Explain 2 input ECL OR/NOR gate with a circuit diagram. 4M

13. Design and explain the operation of a adder/subtractor using 2's complement. 10M

14. a) Design MOD-5 synchronous counter using JK Master Slave FFs. Draw timing diagram for continuous clock. 7M
    b) What is lock out condition in counter. How to avoid this? 3M

15. a) Draw the timing diagrams for READ & WRITE cycles for a static RAM and explain it. 7M
    b) Compare and contrast between static RAM and Dynamic RAM. 3M

16. a) Explain briefly the design of Digital clock. 5M
    b) Explain the operation of universal shift registers. 5M

17. Write short notes on any two 10M
    a) Parity Generator & Checker
    b) PLA architecture
    c)BCD adder

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Code No. 11100 / BL

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I – Semester (Backlog) Examination, May / June 2019

Subject: Computer Organization and Architecture

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (25 Marks)

1 Write the basic computer instruction formats for the memory, register and I/O reference instructions. 3

2 Show the hardware implementations for Booths multiplier. 2

3 Draw a diagram of a bus system using three state buffers and decoder. 3

4 Distinguish between a direct and an indirect address instructions. 2

5 Define the following terms: 2
   i) Micro operation
   ii) Micro program

6 What are the advantages of stack organised computer? 3

7 Hardware control is faster than micro-programmed control unit. Justify this statement. 2

8 Write the differences between RISC and CISC processors. 3

9 Determine the number of clock cycles that it takes to process 200 tasks in a six segment pipelined and non pipelined system. 3

10 How many 256 X 8 RAM chips are needed to provide a memory capacity of 2048x8 bytes? 2

PART – B (50 Marks)

11 a) Draw the basic structure of a computer and explain. 5
   b) Explain various phases of an instruction cycle. 5

12 a) Explain an addressing mode; describe various addressing modes that exist in modern computer. 5
   (b) Explain signed addition/subtraction algorithm with a numerical example. 5

13 a) Write the differences between hardwared and micro programmed Control unit. 5
   b) Formulate a mapping procedure that provides eight consecutive instructions for each routine. The operation code is 6-bits and control memory has 2048 words. 5

14 a) What is the need for I/O interface? Explain functions of a typical 8-bit parallel interface in detail. 7
   b) Write the differences between memory mapped I/O and I/O mapped I/O. 3

15 a) What is cache memory? How its performance can be increased? Discuss. 5
   b) Formulate a six segment instruction pipeline for a computer. Specify the operations to be performed in each segment. 5

16 a) Explain 4-bit combinational circuit shifter using multiplexer? 5
   b) Derive an algorithm in flow chart form for the non-restoring method for fixed point binary division. 5

17 Write short notes on any two of the following:
   a) Addresses sequencer 5
   b) CPU – IOP communication 5
   c) Instruction level parallelism. 5

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Code No. 11103/BL

FACULTY OF ENGINEERING

B.E. 3/4 (M/P/AE) I-Semester (Backlog) Examination, May / June 2019

Subject : Dynamics of Machines

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (25 Marks)

1 What do you understand by gyroscopic couple? Derive a formula for its magnitude. [2]

2 What do mean by 'Equivalent Inertia force'? Explain briefly. [3]

3 What is the function of a governor? How does it differ from that of a flywheel? [2]

4 What are turning moment diagrams? Why are they drawn? [3]

5 Why is balancing of rotating parts necessary for high speed engines? [2]

6 Explain the method of balancing of different masses revolving in the same plane. [3]

7 Explain the terms 'under damping, critical damping' and 'over damping'. [2]

8 What are the three basic elements of vibrating systems? Discuss briefly. [3]

9 What do you understand by transmissibility? [2]

10 Explain the importance of Raleigh's method. [3]

PART – B (50 Marks)

11 (a) Derive an expression for the inertia force due to reciprocating mass in reciprocating engine, neglecting the mass of the connecting rod. [4]

(b) The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m., clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship: [6]

(i) when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.

(ii) when the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity.

The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees.

12 (a) Explain the term height of the governor. Derive an expression for the height in the case of a Watt governor. What are the limitations of a Watt governor? [4]

(b) The turning moment diagram for a multi cylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows: + 52, – 124, + 92, – 140, + 85, – 72 and + 107 mm^2, when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5 m. [6]

13 A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor. [10]

14 A shaft carries five masses A, B, C, D and E which revolve at the same radius in planes which are equidistant from one another. The magnitude of the masses in planes A, C and D are 50 kg, 40 kg and 80 kg respectively. The angle between A and C is 90° and that between C and D is 135°. Determine the magnitude of the masses in planes B and E and their positions to put the shaft in complete rotating balance. [10]

15. A machine of mass 75 kg is mounted on springs of stiffness 1200 kN/m and with an assumed damping factor of 0.2. A piston within the machine of mass 2 kg has a reciprocating motion with a stroke of 80 mm and a speed of 3000 cycles/min. Assuming the motion to be simple harmonic, find: (a) the amplitude of motion of the machine, (b) its phase angle with respect to the exciting force, (c) the force transmitted to the foundation, and (d) the phase angle of transmitted force with respect to the exciting force. [10]

16. The flywheel of an engine driving a dynamo has mass of 200 kg and has a radius of gyration of 30 cm. The shaft at the flywheel end has an effective length of 25 cm and is 15 cm in diameter. The armature mass is 225 kg and has a radius of gyration of 25.5 cm. The dynamo shaft has a diameter of 4.375 cm and an equivalent length of 20 cm. Neglecting the inertia of the shaft and coupling, calculate the frequency of the torsional vibrations and position of node. The modulus of rigidity for the shaft material is 80 GN/m^2. [10]

17 (a) Find the natural frequency of transverse vibrations of a system, having several point loads attached to the same shaft, by Dunkerley's method. [5]

(b) Prove the ratio of two successive amplitudes in an under- damped vibration system is constant. [5]

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Code No. 11116/BL

FACULTY OF ENGINEERING

BE 3/4 (CSE) I-Semester (Backlog) Examination, May / June 2019

Subject: Operating Systems

Time: 3 hours **Max. Marks: 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART - A (Marks: 25 Marks)

1	List the advantages of multiprogramming?		2
2	Distinguish between internal and external fragmentation?		3
3	Define the terms – file, file path, directory?		3
4	Explain safe state and unsafe state?		2
5	Define the terms with respect to disk I/O - seek time, latency time?		3
6	Describe the use of fork () and exec () system calls?		3
7	Explain the need for page-replacement.?		2
8	How is the access matrix useful in providing protection?		2
9	What is a zombie process? What should be done so that a zombie process does not occur?		3
10	What are condition variables, and why do we need them when using monitors?		2

PART- B (5x10= 50 Marks)

11 a Define process state. 2

b Consider the following set of processes with the length of the CPU burst time given in milliseconds 8

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order p1, p2, p3, p4, p5 all at time 0.

i. Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a non preemptive priority (a smaller priority number implies a higher priority) and RR (quantum=1) scheduling.

ii. What is the turnaround time of each process for each of the scheduling algorithms in part (i)

iii. What is the waiting time of each process for each of the scheduling algorithms in part (i) Which of the schedules in part (i) results in the minimal average waiting time?

..2

12	a	Define page fault? When does a page fault occur? Describe the action taken by OS when page fault occurs?	6
	b	Consider a logical address space of eight pages of 1024 words each mapped onto a physical memory of 32 frames a) How many bits are in the logical address? b) How many bits are in the physical address?	4
13	a	Describe the file system of UNIX?	6
	b	For a single -level page table system, with the page table stored in memory. If the hit ratio to a TLB is 80%, and it takes 15 nanoseconds to search the TLB, and 150 nanoseconds to access the main memory, then what is the effective memory access time in nanoseconds?	4
14	a	Define deadlock? what are the four conditions necessary for a deadlock situation to arise? how it can be prevented?	5
	b	Explain the Readers and Writers problem and its solution using the concept of semaphores?	5
15	a	Consider that a disk drive has 5,000 cylinders, numbered 0 to 4,999. The drive is currently serving request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests for each of the following disk scheduling algorithms? A. FCFS B. SSTF C. SCAN D. C-SCAN E. LOOK F. C-LOOK	6
	b	Discuss the different I/0 Performance improvement.	4
16	a	Explain the architectural components of Android OS along with a neatly labelled architectural diagram.	5
	b	Graphical representation of various steps involved in handling an interrupt.	5
17		Write Short Notes on: **ANY TWO**	10
	a	Inter process Communication	
	b	critical section problem	
	c	RAID Structure	

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Code No: 11123/BL

FACULTY OF ENGINEERING

BE 3/4 (IT) I-semester (Backlog) Examination, May / June 2019

Subject : Operating Systems

Time: 3 Hours **Max. Marks: 75**

Note: Answer all questions from part –A and any five question from Part – B

Part – A (25 Marks)

1. What is dual mode operation?
2. List memory Hierarchy 2
3. What is system Boot? 2
4. What is PCB? Draw its slimetine 3
5. List the various operating system services 3
6. What is multi – threading? Give an example. 2
7. Explain about various scheduling criteria 3
8. What is synchronization? 2
9. Give the significance of paging 3
10. What is access matrix? Give an example 3

PART – B (5x10=50 Marks)

11. a) Explain briefly about the operating system structure 5
    b) What are system calls? Explain briefly Various types of system calls 5

12 a) What is a thread? What are the benefits of multithreading 5
   b) Explain about thread libraries 5

13 Consider the following page reference string:
1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 How many page faults would occur. For the following page replacement algorithms, assuming three and four frames? Assuming frames are Initially empty. 10
(i) FIFO page Replacement
(ii) LRU page Replacement
(iii) Optimas page Replacement

14 a) What is meant by critical section problem 3
   b) Explain about bankers algorithm 7

15 a) Explain various allocation methods 5
   b) What do mean by access rights in protection? Explain 5

16 a) Explain how cryptography in used as security tool 6
   b) Explain goals and principles of protection 4

17 Write short notes 10
   a) Segmentation b) Fire walling

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