

FACULTY OF ENGINEERING

BE I – Semester (CBCS) (Backlog) Examination, May/ June 2019

Subject: Engineering Mathematics - I

Time: 3 Hours

Max. Marks: 70

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

PART-A (10x2 = 20 Marks)

1. Find the rank of the matrix $A = \begin{bmatrix} 2 & 1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix}$
2. If 1, -2, 3 are eigenvalues of a matrix A. Then find the eigenvalues of the matrix $B = A^2 + A^3 - A^{-1}$
3. Determine the nature of the series $\sum_{n=1}^{\infty} \frac{1}{n} \sin\left(\frac{1}{\sqrt{n}}\right)$
4. Determine the nature of the series $\sum_{n=1}^{\infty} \left(\frac{n}{3n+1}\right)^n$
5. Find the coefficient of $\left(x - \frac{f}{4}\right)^2$ in the Taylor series expansion of $f(x) = \cos x$ around $x = \frac{f}{4}$
6. Find the radius of curvature of the curve $y = x^4 - 4x^3 - 18x^2$ at $O(0,0)$.
7. If $x = e^u \cos v$, $y = e^u \sin v$, then evaluate $\frac{\partial(x, y)}{\partial(u, v)}$
8. Find $\lim_{(x, y) \rightarrow (1, 1)} \frac{xy^2 - 1}{y - 1}$ if it exists.
9. If \vec{a} is a constant vector and $\vec{r} = xi + yj + zk$ then find $\text{curl}(\vec{a} \times \vec{r})$
10. Find the directional derivative of $f(x, y, z) = xy + yx + zx$ in the direction of the vector $2i + 3j + 6k$ at $P(3, 1, 2)$

PART-B (50 Marks)

11. (a) Find the nature, index and signature of the quadratic form

$$3x_1^2 + 5x_2^2 + 3x_3^2 - 2x_2x_3 + 2x_3x_1 - 2x_1x_2$$

- (b) Find the matrix A whose eigenvalues are 1, 2, 3 and the corresponding eigenvectors are $(1, 2, 1)^T$, $(2, 3, 4)^T$, $(1, 4, 9)^T$

12. (a) Discuss the nature of the series

$$\frac{x}{1.2} + \frac{x^2}{3.4} + \frac{x^3}{5.6} + \dots, \text{ where } x > 0$$

(b) Test the convergence of the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} \cdot n}{n^2 + 3}$.

13. (i) State Rolle's mean value theorem, using it show that between any two roots of

$$e^x \cos x - 1 = 0, \text{ there exists at least one root of } e^x \sin x - 1 = 0$$

(ii) Find the asymptotes of the curve

$$x^3 - 2y^3 + 2x^2y - xy^2 + xy - y^2 + 1 = 0.$$

14. (i) Discuss the maxima and minima of the function $f(x, y) = x^2 + y^2 + \frac{2}{x} + \frac{2}{y}$

(ii) Expand $g(x, y) = e^x \log(1 + y)$ in powers of x and y upto terms of third degree.

15. If $F = (2x - z)i + x^2yj - xz^2k$ and S is the surface bounded by

$$x = 0, y = 0, z = 0, x = 1, y = 1, z = 1, \text{ then evaluate } \iint_S F \cdot \hat{n} \, ds \text{ by using Gauss divergence}$$

Theorem.

16. (i) Find the angle between the surfaces $x^2 + y^2 + z^2 = 22$ and $z = x^2 + 3y$ at $P(3, -2, 3)$

(ii) Verify Cayley Hamilton theorem for the matrix

$$\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

17. (i) Sketch the graph of the curve $y^2(4 - x) = x^3$.

(ii) If $a_n > 0$ and $\sum_{n=1}^{\infty} a_n$ is convergent then determine the nature of the series $\sum_{n=1}^{\infty} \frac{\sqrt{a_n}}{n}$

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) II - Semester (Backlog) Examination, May / June 2019

Subject : Electrical Technology (Part – A)

Time : 1½ Hours

Max. Marks: 38

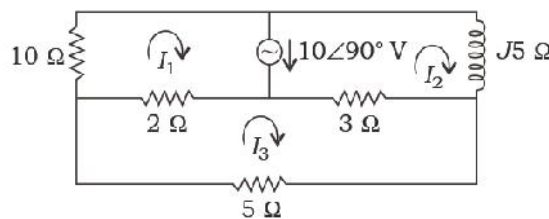
Note: Answer all questions from Part-A, and any three Questions from Part-B

PART-A (14 Marks)

- 1 Define the following terms : (a) Branch (b) Loop (c) Mesh 2
- 2 A certain light bulb with a resistance of 95Ω is labelled '150 W'. Was this bulb designed for use in a 120V circuit or a 220V circuit? Justify your answer. 2
- 3 Why is transformer rated in KVA? 2
- 4 Define the terms: i) synchronous speed (ii) slip speed (iii) rotor speed. 3
- 5 Distinguish between squirrel cage and slip ring rotor of a 3-phase induction motor. 3
- 6 Differentiate between statically induced e.m.f and dynamically induced e.m.f. 2

PART-B (24 Marks)

- 7 (a) Derive the expressions for current and power of a pure resistor circuit with a.c. source. 4
- (b) For the following circuit, find the current in the 5 ohm resistor. 4



- 8 (a) Obtain the equivalent circuit of a single phase transformer referred to primary and secondary. 4
- (b) The equivalent circuit referred to the low tension side of a 250/2500 V single phase transformer is shown in fig.4. the load impedance connected to the high voltage terminal is $380 + j230 \Omega$. For a primary voltage of 250 V, compute, (a) the secondary terminal voltage, (b) primary current and power factor, and (c) power output and efficiency. 4
- 9 (a) Explain in detail about polar curves. 4
- (b) A 500V, 6 pole, 50Hz, Three phase Induction motor develops 20kW. When running at 995 rpm the p.f. is 0.87 lagging. Calculate (a) Slip (b) rotor copper loss (c) the total input if stator loss is 1500W (d) Line current (e) the rotor current frequency. 4
- 10 (a) With suitable example explain in detail about calculation of street lighting. 4
- (b) Obtain the equivalent circuit of a 200/400V, 50Hz, single phase transformer from the following test data: OC test: 200V, 0.7A, 70W on LV side and SC test: 15V, 10A, 85W on HV side. 4
- 11 (a) With neat sketch explain the working of transformer under no-load and lagging power factor load. 4
- (b) A three-phase 400 V, 50Hz, a.c. supply is feeding a three phase delta connected load with each phase having a resistance of 25 ohms, an inductance of 0.15 H and a capacitance of 120 microfarads in series. Determine the line current and total three phase power absorbed. 4

FACULTY OF ENGINEERING**BE 2/4 (Civil) II-Semester (Backlog) Examination, May / June 2019****Subject : Mechanical Technology (Part-B)****Time: 1^{1/2} Hours****Max. Marks: 37**

Note: Answer all questions from Part-A, & Any Three Questions from Part-B.

PART-A (13 Marks)

- | | |
|----------------------------------------------------------------------------------------------------|---|
| 1. What is the criteria for solution of equipment for construction? | 3 |
| 2. Give the application of (i) Trencher (ii) Grader | 2 |
| 3. Differentiate between screw conveyor and Apron conveyor in terms of its constructional features | 2 |
| 4. Mention the construction and working of gyratory crusher | 3 |
| 5. Sketch the cross section of jack hammer | 3 |

PART-B (24 Marks)

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 6. a) Discuss various types of blades available for bull dozers along with their specific usage | 5 |
| b) Write the application of different types of compacting rollers | 3 |
| 7 a) Write the function of following components with belt conveyor system: Belt, Feeders and idlers | 2 |
| b) Classify cranes on the basis of broad construction features and explain the application of each | 6 |
| 8 a) What are the different types of screens used in manufacture of crushed aggregate. Describe the characteristics of each type and explain how screen selection is made | 6 |
| b) Write about the construction of any one pneumatic tool | 2 |
| 9 Describe a basic shovel and show how it can be converted into different excavating machines. What is the field of application of each of these machines | 8 |
| 10 a) Describe the role of compressed air in heavy construction and explain how compressed air is obtained | 6 |
| b) Explain the usage of construction elevator and passenger lift. | 2 |

FACULTY OF ENGINEERING**B.E. 2/4 (EEE) II - Semester (Backlog) Examination, May / June 2019****Subject : Electrical Machines – I****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part-A & any five questions from Part-B.****PART – A (25 Marks)**

- 1 Define co-energy and explain its significance.
- 2 Explain a doubly excited system with suitable examples.
- 3 Armature of a 4 pole DC machine has 24 slots with double layer winding. Find back pitch and front pitch for progressive lap winding.
- 4 Define critical field resistance.
- 5 Define back emf. What is its significance in a dc motor?
- 6 List the applications of dc series motor.
- 7 List various losses in a dc machine
- 8 Hopkinson's test is called regenerative test, Explain.
- 9 What is an ideal transformer?
- 10 Explain polarity test.

PART – B (50 Marks)

- 11 (a) Explain flow of energy in electromechanical systems. [4]
(b) Derive the equation for Mechanical force produced in a singly excited system. [6]
- 12 (a) Classify dc generators according to excitation with circuit models. [5]
(b) A 4 pole DC generator has wave connected armature with 50 slots and 20 conductors per slot. The useful flux per pole is 2 mWb. What will be the voltage generated when driven at 1500 rpm? [5]
- 13 (a) Explain dc series motor speed control methods with neat diagrams. [5]
(b) A 460 V series motor runs at 500 r p m taking a current of 40A. Calculate the percentage change in torque if the load is reduced so that the motor is taking 30A. Total resistance of the armature and field circuit is 0.8 . Assume flux and field current to be proportional. [5]
- 14 (a) Explain Hopkinson's test conducted of two similar dc shunt machines with neat diagram. Deduce the necessary equations for efficiency of motor and generator. [6]
(b) A shunt motor operating on 200 V mains takes 6A on no load. The armature and shunt field resistances are 0.5 and 200 respectively. Calculate the efficiency as a generator supplying a load of 5 kW. [4]

..2..

- 15 (a) Define regulation of a transformer, derive the equation for it. [5]
(b) The following test results are obtained for a 20kVA, 50 Hz, 2400/240 V transformer
O C Test (L V) : 240 V, 1.066 A, 126W
S C Test (H V) : 57.5 V, 8.34 A, 284 W
Find the efficiency at full load, 0.8 pf lagging. [5]
- 16 (a) Explain energy flow in electromechanical devices. [5]
(b) Explain methods of improving commutation in a dc machine. [5]
- 17 Write short notes on any two
(a) 4 point starter [5]
(b) Field's test [5]
(c) Equivalent circuit of transformer [5]

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FACULTY OF ENGINEERING**B.E. 2/4 (Inst.) II - Semester (Backlog) Examination, May / June 2019****Subject : Electrical 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 Write about the RESIDUAL VOLTAGE. [2]
- 2 Why D.C series motor should not run without load? [2]
- 3 Explain the principle of working of a transformer. [3]
- 4 Draw the vector diagram of loaded Transformer at lagging PF. [3]
- 5 Explain why single phase induction motor is not self-starting. [3]
- 6 Write any four differences between salient pole and non-salient type rotor. [2]
- 7 Define Slip and draw Torque- Slip characteristics of an Induction Motor. [3]
- 8 Necessity of damping winding in a synchronous motor. [2]
- 9 What is synchronous condenser? [3]
- 10 Why a capacitor is used in a Single Phase Induction motor? [2]

PART – B (50 Marks)

- 11 (a) Explain the construction of D.C Machine. [4]
(b) A 100KW belt driven shunt generator running at 300rpm on 220V bus bars continue to run as a motor when the belt breaks, then taking 10KW, what will be its speed. Armature resistance is 0.025 ohms. Field resistance is 60 ohms. Contact drop under each brush = 1V. [6]
- 12 (a) Derive the Torque Equation of D.C Motor. [4]
(b) A 600V dc motor drives a 60KW load at 900rpm. The shunt field resistance is 100ohms and armature resistance is 0.16 ohms. If the motor efficiency is 85% determine (i) the speed at no load (ii) Rotational losses [6]
- 13 (a) State and explain the different losses occur in a transformer. [4]
(b) A 5KVA 200/400V ,50Hz 1-ph transformer gave the following test data: [6]
O.C test (L.V side): 200V, 0.7A, 60W
S.C test (H.V side): 22V, 16A,120W
If the transformer operates on full load, determine the regulation at 0.9 p.f lag
- 14 (a) Explain the operation of a synchronous motor. [4]
(b) A 2KV 1- \emptyset alternator was tested on O.C and S.C. The details are as follows; A field current of 2.5A produce S.C current of 100A. With O.C the same field current produces an emf of 500V. The effective resistance of armature is 0.8ohms. Calculate the regulation at full load current of 100A. [6]
- 15 (a) Explain how rotating magnetic field setups in an Induction motor. [5]
(b) The Power input to a 500V, 50Hz,6 pole, 3 - \emptyset I.M running at 975rpm is 40KW. The stator losses are 1KW & friction & windage losses total 2KW . Calculate (a) slip (b) rotor Cu loss (c) the output horse power (d) efficiency [5]
- 16 (a) Explain in brief about Double field revolving theory. [5]
(b) With a neat sketch explain the operation of stepper motor. [5]
- 17 Write a short notes on
(i) Necessity of starter [3]
(ii) Why transformer is rated in KVA [3]
(iii) Why 1- \emptyset Induction motor is not self-starting? [4]

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) II – Semester (Backlog) Examination, May/June 2019

Subject: Signal Analysis and Transform Techniques

Time: 3 hours

Max. Marks : 75

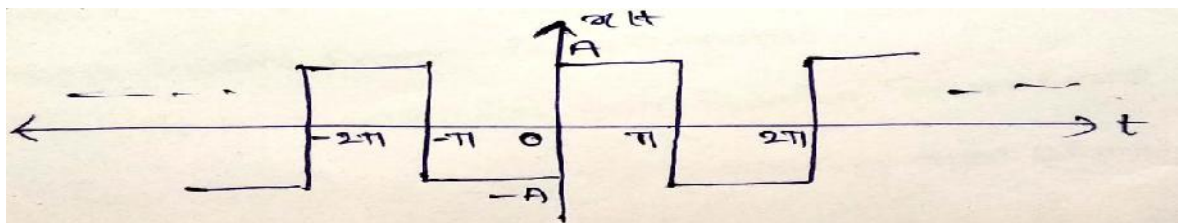
Note : Answer All Questions from Part – A and any five questions from Part – B.

PART – A (25 Marks)

1. Define a Signal and a System. [2]
2. Sketch the following signals
 - (i) $2u(t+2)-2u(t-3)$
 - (ii) $r(-t)u(t+2)$ [3]
3. Show that $x(t)=2$ and $y(t)= 3(1-2t)$ are orthogonal over interval $[0,1]$ [3]
4. What are Dirichlet's conditions for the existence of Fourier transform? [2]
5. Differentiate auto correlation and cross correlation? [2]
6. Find the Laplace Transform of unit step signal and its ROC? [3]
7. Difference between Fourier Transform and Z-Transform. [2]
8. Find the Z Transform of $x(n)=n\delta(n)$. [3]
9. State any two properties of correlation? [2]
10. Write the advantages of sampling the Z-Transform? [3]

PART – B (50 Marks)

- 11.(a) Determine whether the following signals are energy signals or power signals and calculate their energy or power.
 - (i) $t^3u(t)$
 - (ii) $r(t-2)-r(t-3)$ [5]
- (b) Find the linearity and Invariance of the following systems
 - (i) $y(t)=2x^2(t)$
 - (ii) $y(t)=x(t^2)$ [5]
12. Obtain the trigonometric Fourier series for the waveform shown in figure bellow [10]



13. (a) State and Prove Time shifting property and Frequency shifting property of Laplace Transform. [5]
- (b) Find the auto correlation of the signal $x(t)=A\cos(\omega_0 t)$. [5]

Contd...2

14. (a) Find the Z-Transform and ROC of $X(z)$ for

$$x(n) = 3\left(\frac{5}{7}\right)^n u(n) + 2\left(-\frac{1}{3}\right)^n u(n) \quad [5]$$

(b) Find the inverse Z-Transform of

$$X(z) = \frac{z(z-1)}{(z+2)(z+1)^3} \quad [5]$$

15. Find the convolution of the signals $x(n)=\{1,2,2,1\}$ and $h(n)=\{3,4,2\}$ using graphical Method. [10]

16. (a) What are the basic operations on signals? Illustrate with example. [5]

(b) State and prove convolution property in Fourier Transform. [5]

17. (a) Find the Laplace Transform of signals $x(t)=e^{-a t} u(t) - e^{-b t} u(-t)$ [5]

(b) Compare Laplace transform and Z-Transform. [5]

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FACULTY OF ENGINEERING
B.E. 2/4 (M/P/A.E) II-Semester (Backlog) Examination, May / June 2019

Subject: Kinematics of Machines

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) Give Classification of Kinematic pairs.
- 2) State Grubler's criterion for degree of freedom.
- 3) State Kennedy's Theorem.
- 4) Sketch a 4 bar mechanism and identify all the I-Centers in it.
- 5) State the conditions for maximum power transmission through belt drive.
- 6) State the conditions at which uniform pressure and uniform wear criterion are applicable.
- 7) State the expression for maximum velocity and acceleration in SHM and uniform acceleration motions.
- 8) Sketch the various types of cam and followers.
- 9) Define contact ratio in gear drives.
- 10) What type of the gear train is used in automobile differential? Give justifications.

PART-B (50 Marks)

- 11) Explain with neat sketch principle of straight line motion mechanism. State the conditions and prove its principle.
- 12) Explain with neat sketch principle of quick return mechanism. State the applications.
- 13) A shaft has a number of collars integrals with it. The external dia meter of the collars is 400 mm and shaft dia meter is 250 mm. If the uniform intensity of pressure is 0.35 N/mm² and its coefficient of friction is 0.05. Estimate
 - 1) Power absorbed in overcoming friction when the shaft runs at 105 rpm and carries a load of 150 KN.
 - 2) Number of collars required.
- 14) Design a cam to raise a valve with simple harmonic motion through 50 mm in 1/3 of a revolution, keep it fully raised through 1/12 revolution and to lower it with harmonic motion in 1/6 revolution. The valve remains closed during the rest of the revolution. The diameter of the roller is 20 mm and the minimum radius of the cam is 25 mm. The diameter of the camshaft is 25 mm. The axis of the valve rod passes through the axis of the camshaft. If the camshaft rotates at uniform speed of 100 rpm find the maximum velocity and acceleration of a valve during raising and lowering.
- 15) Two gear wheels mesh externally and are to give a velocity ratio of 3. The teeth are of involute form of module 6. The standard addendum is 1 module. If the pressure angle is 18° and pinion rotates at 90rpm. find: 1. the number of teeth on each wheel, so that the interference is just avoided, 2. the length of the path of contact, and 3. the maximum velocity of sliding between the teeth.

-2-

- 16) In an epicyclic gear train, as shown in Fig.1, the number of teeth on wheels A, B and C are 48, 24 and 50 respectively. If the arm rotates at 400 rpm. clockwise, find:
 1. Speed of wheel C when A is fixed, and 2. Speed of wheel A when C is fixed.

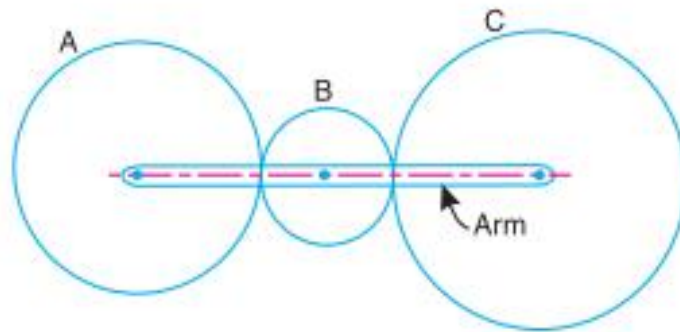


Fig: 1

- 17) Explain any Two of the following
- Multi plate clutch principle and related equations
 - Ackerman steering mechanism and condition for proper steering
 - Pivot and collar thrust bearings and related equations.

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FACULTY OF ENGINEERING**B.E. 2/4 CSE II Semester (Backlog) Examination, May / June 2019****Subject: Principles of Programming Languages****Time: 3 Hours****Max. Marks: 75****Note: Answer all questions from Part – A, & Any five questions from Part – B.****PART – A (25 Marks)**

1. Write the differences between logic programming and concurrent programming (3)
2. What is type inferencing? (2)
3. What are guarded commands? (3)
4. Define template. Give example. (2)
5. What is short circuit evaluation? (2)
6. Write the differences between compiler and interpreter. (3)
7. What is an alias? Give an example? (2)
8. What is a Named constant? Give an example. (3)
9. Write important uses of programming languages. (2)
10. What is a variable and what are the attributes of a variable? (3)

PART – B (50 Marks)

11. (a) Discuss features and importance of the programming languages. (5)
- (b) Draw the syntax tree for the following. (5)
$$a+b*c/d + e-f$$
12. (a) Distinguish between the following data types (5)
- (i) arrays (ii) records
- (b) What is call-by-value and call-by-reference? Give suitable example. (5)
13. (a) What are recursive types? (5)
- (b) Explain concurrency mechanism in Ada. (5)
14. Explain the concept of inheritance with example. (10)
15. (a) Explain Logic programming language features. (5)
- (b) Write short notes on Scheme programming language. (5)
16. Explain the various approaches for expression evaluation in Functional programming language. (10)
17. Write short notes on: (10)
- (a) Abstract data types
- (b) Polymorphism

FACULTY OF ENGINEERING**B.E. 2/4 (I.T) II – Semester (Backlog) Examination, May/ June 2019****Subject: Data Communications****Time: 3 Hours****Max. Marks: 75****Note: Answer all questions from Part – A, & Any five questions from Part – B.****PART – A (25 Marks)**

1. Explain the key elements of the Communication Model. (3)
2. Differentiate between guided media and unguided media. (3)
3. What are the two functions performed by the Antenna? (2)
4. What functions does a Modem perform? (2)
5. What is piggy backing? (2)
6. What is frequency hopping spread spectrum? (3)
7. What is the difference between virtual channel and virtual path? (2)
8. What is the Ad-hoc networking? (2)
9. What is the difference between store and forward switch and cut-through switch? (3)
10. What geometric shape is used in cellular system design and why? (3)

PART – B (50 Marks)

11. a) Discuss briefly about each of the OSI layers. (5)
b) List and explain transmission impairments. (5)
12. a) Explain in detail about ATM Cell format. (6)
b) Explain about HEC Operation at receiver. (4)
13. (a) Explain about different LAN Topologies. (6)
b) What are the advantages of Backbone LANs. (4)
14. Explain about Blue tooth Architecture in detail. (10)
15. a) Explain in detail about IEEE 802.3 frame format. (5)
b) Describe CSMA/CD Operations. (5)
16. (a) Illustrate the protocol architecture of 802.11 (5)
b) Discuss the third generation systems of cellular wireless networks. (5)
17. Write short notes on: (10)
 - (a) ATM adaptation Layer
 - (b) X.25
 - (c) Stop-and-wait ARQ