

**Code: 19A232T**

II B.Tech. I Semester Supplementary Examinations July/August 2022

**Circuit Theory**

( Electrical and Electronics Engineering )

Max. Marks: 70

Time: 3 Hours

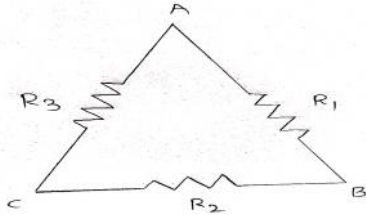
Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks      CO      Blooms Level

**UNIT-I**

1. Apply Delta to Star conversion and derive the Star connection resistances.

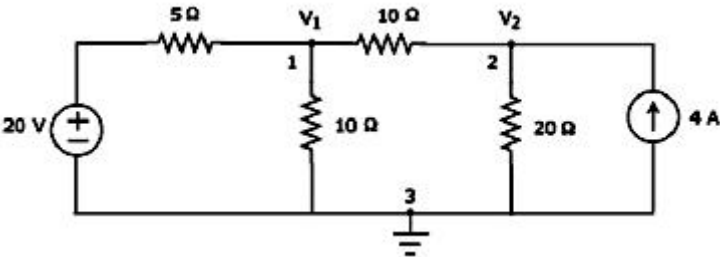


14M      1      3

**OR**

2. a) Recall the Voltage-Current relationship for Resistor, Inductor and Capacitor.  
 b) Calculate node voltages using Nodal analysis.

4M      1      1



10M      1      3

**UNIT-II**

3. a) List out any five advantages of an AC supply.  
 b) List out different types of AC waveforms.

7M      2      1  
 7M      2      1

**OR**

4. Determine the expression for Resonant frequency of a series RLC circuit.

14M      2      3

**UNIT-III**

5. Determine the relationship between line voltage and phase voltage for a balanced 3-Ø star connected system with suitable diagrams.

14M      3      3

**OR**

6. Determine the expression for power factor using two watt-meter method for a balanced 3-Ø star connected load with suitable diagrams.

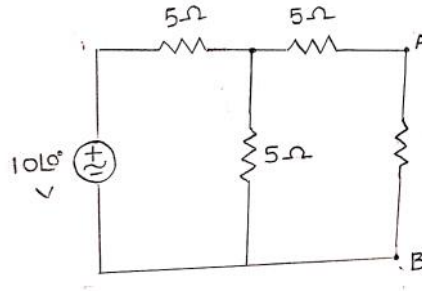
14M      3      3

<b>UNIT-IV</b>
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- |                                                  |    |   |   |
|--------------------------------------------------|----|---|---|
| 7. a) Explain Thevenin's theorem with an example | 7M | 4 | 2 |
| b) Explain Norton's theorem with an example      | 7M | 4 | 2 |

**OR**

8. a) Calculate the maximum power transferred between the terminals AB using maximum power transfer theorem.



	7M	4	3
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- |                                                       |    |   |   |
|-------------------------------------------------------|----|---|---|
| b) List out the limitations of Super-Position theorem | 7M | 4 | 2 |
|-------------------------------------------------------|----|---|---|

<b>UNIT-V</b>
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9. a) Show that the relationship between the self-inductances, mutual inductances and co-efficient of coupling is

$$K = \frac{M}{\sqrt{L_1 L_2}}$$

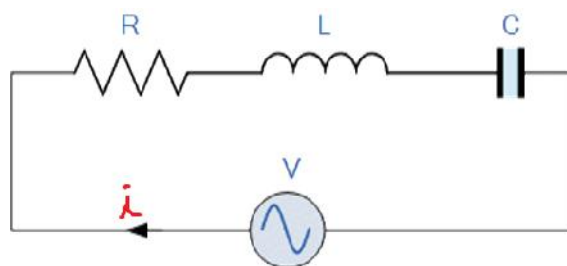
	10M	5	1
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- |                                                   |    |   |   |
|---------------------------------------------------|----|---|---|
| b) Explain Self-Inductance and Mutual inductance. | 4M | 5 | 2 |
|---------------------------------------------------|----|---|---|

**OR**

- |                                               |    |   |   |
|-----------------------------------------------|----|---|---|
| 10. a) Define                                 |    |   |   |
| i) graph    ii) tree    iii) link    iv) twig | 7M | 6 | 1 |

- b) Modify the given network in to its Dual network.



	7M	6	3
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<b>R-19</b>
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**Code: 19A233T**

II B.Tech. I Semester Supplementary Examinations July/August 2022

**Electrical Machines-I**

( Electrical and Electronics Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. Derive the expressions for de-magnetizing and cross-magnetizing ATs per pole in case the brushes are given a lead of degrees from GNA in case of generator.	14M	1	2
<b>OR</b>			
2. Explain the Armature reaction in DC Generator with neat diagrams. List the effects of armature reaction in DC Generator.	14M	1	2
<b>UNIT-II</b>			
3. Explain the load characteristics of following generator with suitable graphs. (i) Shunt Generator (ii) Series Generator	14M	2	2
<b>OR</b>			
4. Elucidate the external characteristics of various DC generators bringing out the applications of each.	14M	2	2
<b>UNIT-III</b>			
5. Explain the need for starter in DC motor. With neat diagram explain the construction and working 3 point starter.	14M	3	2
<b>OR</b>			
6. On what factors does the speed of DC motor depend? Describe the method of controlling the speed of a DC shunt motor for obtaining the speeds (i) Above base speed (ii) Below base speed	14M	3	2
<b>UNIT-IV</b>			
7. Explain how will you pre determine the efficiency and regulation by conducting OC & SC tests on a single phase transformer with neat circuit diagrams.	14M	4	2
<b>OR</b>			
8. Explain the performance of transformer on load condition with neat diagram. Also draw the vector diagrams for inductive and capacitive loads.	14M	4	2
<b>UNIT-V</b>			
9. a) Write a short note on $\Delta/Y$ and $Y/\Delta$ connections of 3-Ph transformer with neat diagrams. Mention the advantages of each connection	8M	5	1
b) Write the advantages of a transformer bank of three 1-Ph transformers.	6M	5	1
<b>OR</b>			
10. a) Derive the equation for copper material saving in auto transformer compare to two winding transformer.	8M	5	2
b) Write a short note on tertiary winding.	6M	5	2

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**Code: 19A337T**

II B.Tech. I Semester Supplementary Examinations July/August 2022

**Fluid Mechanics and Hydraulic Machinery**

( Electrical and Electronics Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT-I**

1. a) Calculate the Density, Specific weight and Specific gravity of One liter of liquid, which weighs 7N. 07M
- b) Define i) Steam Line ii) Streak Line iii) stream Tube 07M

**OR**

2. An inverted manometer is connected to two horizontal pipes A and B through water is flowing. The vertical distance between the axes of these pipes is 30cm. when an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns of the inverted manometer [ when measured from the Centre lines of the pipes] are found to be same and equal to 35 cm. Determine the difference of pressure between the pipes. 14M

**UNIT-II**

3. a) Explain the TEL and HGL with neat sketch. 07M
- b) Define the following with suitable examples. 07M
- i) Body forces ii) Surface forces iii) Line forces.

**OR**

4. State the momentum equation and derive an expression for the force exerted by a flowing fluid on a pipe bend. 14M

**UNIT-III**

5. a) A jet of water of diameter 75 mm moving with a velocity of 25m/sec strikes a plate in such a way that the angle between the jet and plate is  $60^\circ$ . Find the force exerted by the jet on the plate (i) in the direction normal to the plate (ii) in the direction of the plate. 07M
- b) Derive an expression for force exerted by the jet on the flat vertical plate moving in the direction of the jet. 07M

**OR**

6. A jet of water having a velocity of 15 m/sec strikes a curved vane which is moving with a velocity of 5 m/sec. The vane symmetrical and is so shaped that the jet is deflected through  $120^\circ$ . Find the angle of jet at inlet of vane so that there is no shock. What is the absolute velocity of the jet at outlet in magnitude and direction and work done per unit weight of water? Assume the vane to be smooth. 14M

**UNIT-IV**

7. a) Define the various types of efficiencies of hydraulic turbines. 06M
- b) Explain the various parts of Pelton turbine and its working with the neat sketch. 08M

**OR**

8. A Kaplan turbine working under a head of 20 m develops 11772 KW shaft power. The outer diameter of the runner is 3.5m and hub diameter is 1.75m. The guide blade angle at extreme edge of the runner is  $35^\circ$ . The hydraulic and overall efficiencies of the turbine are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine: (i) Runner vane angles at inlet and outlet at the extreme edge of the runner (ii) speed of the turbine. 14M

**UNIT-V**

9. Define indicator diagram and also show that area of indicator diagram is proportional to the work done by the reciprocating pump. 14M

**OR**

10. a) Explain the working of double acting reciprocating pump with neat sketch. 06M
- b) A single-acting reciprocating pump, running at 50 r.p.m. delivers  $0.00736 \text{ m}^3/\text{s}$  of water. The diameter of the piston is 200 mm and stroke length 300 mm. The suction and delivery heads are 3.5 m and 11.5 m respectively. Determine: (i) Theoretical discharge, (ii) Co-efficient of discharge, (iii) Percentage slip of the pump, and (iv) Power required to run the pump. 08M

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<b>R-19</b>
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**Code: 19AC31T**

II B.Tech. I Semester Supplementary Examinations July/August 2022

**Partial Differential Equations and Complex Variables**

( Common to All Branches )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks	CO	Blooms Level
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**UNIT-I**

- |                                                                             |    |     |    |
|-----------------------------------------------------------------------------|----|-----|----|
| 1. a) Find the Laplace Transform of $e^{2t} + 4t^3 - 2 \sin 3t + 3 \cos 3t$ | 7M | CO1 | L1 |
| b) Find the L.T of $(t^2 + 1)^2$                                            | 7M | CO1 | L1 |

**OR**

- |                                                                   |     |     |    |
|-------------------------------------------------------------------|-----|-----|----|
| 2. Find $L \left\{ e^{-3t} \int_0^t \frac{\sin t}{t} dt \right\}$ | 14M | CO1 | L1 |
|-------------------------------------------------------------------|-----|-----|----|

**UNIT-II**

- |                                                           |     |     |    |
|-----------------------------------------------------------|-----|-----|----|
| 3. Find inverse L.T of $\frac{5s - 2}{s^2(s + 2)(s - 1)}$ | 14M | CO2 | L1 |
|-----------------------------------------------------------|-----|-----|----|

**OR**

- |                                                                                        |     |     |    |
|----------------------------------------------------------------------------------------|-----|-----|----|
| 4. Using convolution theorem , find $L^{-1} \left\{ \frac{1}{(s + a)(s + b)} \right\}$ | 14M | CO2 | L3 |
|----------------------------------------------------------------------------------------|-----|-----|----|

**UNIT-III**

- |                                                                                                                                                                                        |     |     |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| 5. Obtain the Fourier series for $f(x) = x - x^2$ in the interval $[-f, f]$ . Hence Show that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{f^2}{12}$ | 14M | CO3 | L3 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|

**OR**

- |                                                                                                                                                                              |     |     |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| 6. Find the half range sine series for $f(x) = x(f - x)$ in $0 < x < f$ deduce that $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} + \dots = \frac{f^2}{32}$ | 14M | CO3 | L1 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|

**UNIT-IV**

- |                                                                                                                                                                                                                                                                        |     |     |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| 7. Use separation of variables to solve $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial y} + 2u$ in the form $u = f(x)g(y)$ . Obtain the solution satisfying $u = 0, \frac{\partial u}{\partial x} = 1 + e^{-3y}$ when $x = 0$ for all values of $y$ . | 14M | CO4 | L3 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|

**OR**

- |                                                                                                                                                                                                                                                                                |     |     |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|
| 8. A homogeneous rod of conducting material of length 100 cm has its ends kept at zero temperature and the temperature initially is $u(x,0) = \begin{cases} x & ; 0 \leq x \leq 50 \\ (100 - x) & ; 50 \leq x \leq 100 \end{cases}$ Find the temperature $u(x,t)$ at any time. | 14M | CO4 | L3 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|

**UNIT-V**

- |                                                                                  |     |     |    |
|----------------------------------------------------------------------------------|-----|-----|----|
| 9. Find the conjugate harmonic function of the harmonic function $u = x^2 - y^2$ | 14M | CO5 | L1 |
|----------------------------------------------------------------------------------|-----|-----|----|

**OR**

- |                                                                          |     |     |    |
|--------------------------------------------------------------------------|-----|-----|----|
| 10. Evaluate $\int_c \frac{e^{2z}}{(z-1)(z-2)} dz$ where $c :  z  = 3$ . | 14M | CO5 | L5 |
|--------------------------------------------------------------------------|-----|-----|----|

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Hall Ticket Number :									
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**R-19**

**Code: 19A234T**

II B.Tech. I Semester Supplementary Examinations July/August 2022

**Switching Theory and Logic Design**  
( Electrical and Electronics Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )  
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Marks

**UNIT-I**

- 1. a) Prove that OR-AND network is equivalent to NOR-NOR Network 6M
- b) A 7 bit hamming code is transmitted through a noisy channel. Find the error assuming a single error has occurred. The given message is 1010101. 8M

**OR**

- 2. a) Represent +25 and -25 in sign magnitude, sign 1's complement and sign 2's complement representation. 6M
- b) i) Convert the hexadecimal number 68BE to binary and convert it from binary to octal  
        ii) Express the number  $(26.24)_8$  in Decimal  
        iii) Implement AND Gate using NAND Gates. 8M

**UNIT-II**

- 3. a) What is the difference between canonical form and standard form? Which form is preferable while implementing a Boolean function with gates? 7M
- b) Implement EX-NOR Gate using only NAND Gates. 7M

**OR**

- 4. Using the Quine-McCluskey method of tabular reduction minimize the given function  $f(A,B,C,D) = m(0,1,5,7,8,10,14,15)$ . and realize using basic gates. 14M

**UNIT-III**

- 5. a) Compare Programmable logic devices. 7M
- b) Draw and explain the block diagram of n-bit parallel adder. 7M

**OR**

- 6. a) Design 4x16 decoder using two 3x8 decoders with block diagram. 7M
- b) What is encoder? Design octal to binary encoder. 7M

**UNIT-IV**

- 7. a) Design UP/DOWN synchronous counter using JK Flip-flop 8M
- b) Design mod 6 synchronous counter using flip-flop 6M

**OR**

- 8. a) Explain the operation of twisted ring counter with the help of logic diagram and its timing diagrams. 7M
- b) Explain the operation of D Flip-Flop. 7M

**UNIT-V**

- 9. For the state table of the machine given below find the equivalent partition and a corresponding reduced machine in standard form and also Draw the state diagram for the reduced machine. 14M

PS	NS/Z	
	X=0	x=1
A	D/0	H/1
B	F/1	C/1
C	D/0	F/1
D	C/0	E/1
E	C/1	D/1
F	D/1	D/1

14M

**OR**

- 10. Explain the minimization procedure for determining the set of a completely specified sequential machine. 14M

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**R-19**

**Code: 19A231T**

II B.Tech. I Semester Supplementary Examinations July/August 2022

**Analog Electronics**

( Electrical and Electronics Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. Derive the expression to obtain feedback input resistance, voltage gain and output resistance for a current series feedback amplifier with neat sketches.	14M	CO1	L2
<b>OR</b>			
2. With neat sketch explain the operating principle of crystal Oscillator	14M	CO1	L2
<b>UNIT-II</b>			
3. a) Illustrate the DC characteristics of an OP amp	9M	CO2	L2
b) Discuss the ideal characteristics of ideal op-amp.	5M	CO2	L1
<b>OR</b>			
4. Illustrate the AC characteristics of an OP amp	14M	CO2	L2
<b>UNIT-III</b>			
5. Explain the working of Schmitt trigger circuit using Op-amp with necessary diagrams	14M	CO3	L2
<b>OR</b>			
6. Discuss the working principle of comparator and explain any three application of comparator.	14M	CO3	L2
<b>UNIT-IV</b>			
7. Discuss any three application of Astable Multivibrator using IC555 timer.	14M	CO4	L2
<b>OR</b>			
8. Explain the first order High-pass RC Active filter with its relevant expression.	14M	CO4	L2
<b>UNIT-V</b>			
9. Explain the working principle of Successive approximation ADC with a neat diagram	14M	CO5	L2
<b>OR</b>			
10. Construct the Monolithic DAC and explain in detail.	14M	CO5	L2

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