

Register No.: ..... Name : .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**  
 (AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY,  
 THIRUVANANTHAPURAM)  
**SIXTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**(2020 SCHEME)**

**Course Code : 20EET308**

**Course Name : Comprehensive Course Work**

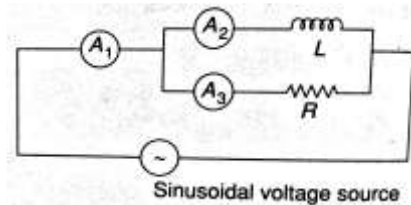
**Max. Marks : 50**

**Duration : 75 Minutes**

**PART A**

**(Answer all questions. Each question carries 1 mark)**

- 1 In the given figure,  $A_1$ ,  $A_2$  and  $A_3$  are ideal ammeters. If  $A_2$  and  $A_3$  read 3A and 4A, respectively, then  $A_1$  should read.



- |              |              |
|--------------|--------------|
| <b>A.</b> 1A | <b>B.</b> 5A |
| <b>C.</b> 7A | <b>D.</b> 4A |
- 2 The impulse response of an RL circuit is a.....
- |                                       |   |
|---------------------------------------|---|
| <b>A.</b> Rising exponential function | <b>B.</b> Decaying exponential function |
| <b>C.</b> Step function               | <b>D.</b> parabolic function            |
- 3 The expression of current from the circuit (Fig 7) shown below is?

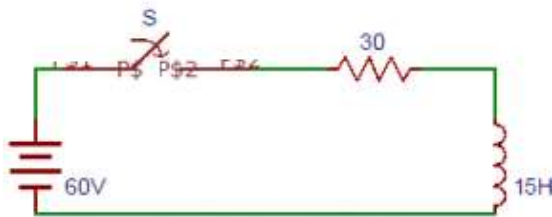


Fig 7

- |                             |                             |
|-----------------------------|-----------------------------|
| <b>A.</b> $i=2(1-e^{-2t})A$ | <b>B.</b> $i=2(1+e^{-2t})A$ |
| <b>C.</b> $i=2(1+e^{2t})A$  | <b>D.</b> $i=2(1+e^{2t})A$  |



- 12 On the two sides of a star/delta transformer  
**A.** Voltage and currents are both in phase **B.** Voltage and currents both differ in phase by  $30^\circ$   
**C.** Voltage differ by  $30^\circ$  but currents are in phase **D.** Currents differ in phase by  $30^\circ$  but voltages are in phase.
- 13 Which one of the following demultiplexers require only one select line?  
**A.** 1 to 2 demultiplexer **B.** 1 to 8 demultiplexer  
**C.** 1 to 4 demultiplexer **D.** 1 to 16 demultiplexer
- 14 In a T Flip flop the ratio of frequency of the input pulse to frequency of output pulse is  
**A.**  $1/2$  **B.** 1  
**C.** 2 **D.** 3
- 15 Which one of the following follows the combinational logic type  
**A.** Demultiplexer **B.** Multiplexer  
**C.** Both A,B **D.** None
- 16 What is the octal equivalent of binary number 10111101?  
**A.** 675 **B.** 275  
**C.** 572 **D.** 573
- 17 What is the value of  $(A+B^{\sim}C^{\sim}) \cdot (AB^{\sim}+ABC)$   
**A.** 0 **B.** 1  
**C.** A **D.** ABC
- 18 The binary addition of 1111 and 1011 is  
**A.** 100010 **B.** 1010  
**C.** 11010 **D.** 11110
- 19 The component which makes and breaks the contacts in a motor starter is  
**A.** Circuit breaker **B.** Relay  
**C.** Contactor **D.** Push Button
- 20 The maximum demand of a consumer is 2kW and its daily energy consumption is 20 units. Then his load factor is  
**A.** 10% **B.** 41.6%  
**C.** 50% **D.** None of the above
- 21 Corona in DC supply is\_\_\_\_\_  
**A.** zero **B.** Less than AC  
**C.** Greater than AC **D.** Cannot be calculated
- 22 Percentage differential protection in a transformer is recommended to prevent mal-operation due to  
**A.** External fault currents **B.** Internal fault currents  
**C.** Magnetizing currents **D.** None of the above
- 23 Ferranti effect on long overhead lines is experienced when it is:  
**A.** On full load at 0.8 pf lag **B.** On full load at upf  
**C.** Lightly loaded **D.** In all these cases
- 24 If the time of operation of a relay for unity TMS is 10 secs, the time of operation for 0.5 TMS will be  
**A.** 5 secs **B.** 20 secs  
**C.** 10 secs **D.** None of the above

- 25 What are the mathematical tools to convert a system from a time domain to frequency domain?
- A.** Fourier series, Fourier transform, Laplace transform, Z-transform      **B.** Fourier series only
- C.** Fourier series and Laplace transform only      **D.** Fourier series, Fourier transform and Laplace transform only
- 26 Which one of the following systems is causal
- A.**  $y(t)=x(t)+x(t-3)+x(t^2)$       **B.**  $y(n)=x(n+2)$
- C.**  $y(t)=x(t-1)+x(t-2)$       **D.**  $y(n)=x(2n^2)$
- 27 The range for unit step function for  $u(t - a)$ , is \_\_\_\_\_
- A.**  $t < a$       **B.**  $t \leq a$
- C.**  $t \geq a$       **D.**  $t = a$
- 28 What is the value of  $d[0]$ , such that  $d[n]$  is the unit impulse function?
- A.** 0      **B.** 0.5
- C.** 1.5      **D.** 1
- 29 Determine the nature of the system:  $y(t)= t^2 x(t-1)$
- A.** Linear, time invariant      **B.** Linear, time variant
- C.** Non-linear, time invariant      **D.** Non-linear, time variant
- 30 Discrete time signal is derived from continuous time signal by \_\_\_\_\_ process.
- A.** Addition      **B.** Multiplication
- C.** Sampling      **D.** Addition and multiplication

### PART B

**(Answer all questions. Each question carries 2 marks)**

- 31 A  $20 \mu\text{F}$  capacitor in the RC circuit shown has an initial charge of  $q_0 = 500 \mu\text{C}$  with the polarity as shown Fig 12. The switch is closed at time  $t = 0$ . Find the current transient.

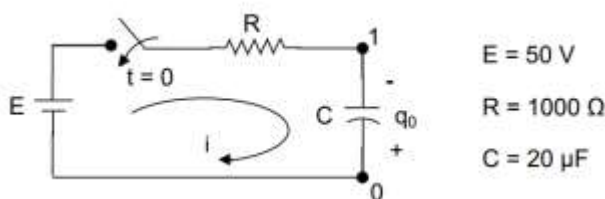


Fig 12

- A.**  $50 - 75 e^{-50 t}$       **B.**  $0.075 e^{50 t} \text{ A}$
- C.**  $0.075 e^{-50 t} \text{ A}$       **D.**  $50 + 75 e^{-50 t}$
- 32 The line A to neutral voltage is  $10 \angle 15^\circ$  for a balanced three phase star-connected load with phase sequence ABC. The voltage of line B with respect to line C is given by
- A.**  $10\sqrt{3} \angle 105^\circ$       **B.**  $10 \angle 105^\circ$
- C.**  $-10\sqrt{3} \angle 75^\circ$       **D.**  $-10\sqrt{3} \angle 90^\circ$

- 33 A 3-phase induction motor draws 1000kVA at a p.f. of 0.8 lag. A synchronous motor is connected in parallel to draw an additional 750kVA at a power factor of 0.6 lead. The p.f. of the total load supplied by the mains is.....
- A.** Unity **B.** 0.707 lead  
**C.** 0.6 lag **D.** Zero
- 34 The volt per turn in the primary winding of a 1000V/250V 50 Hz, single phase transformer is 4V. What is its secondary volt per turn?
- A.** 16 V **B.** 8 V  
**C.** 4 V **D.** 1 V
- 35 The minimum number of 2-input NAND gates required to realize a full-adder/full-subtractor is
- A.** 8 **B.** 10  
**C.** 9 **D.** 12
- 36 The following hexadecimal number  $(1E.43)_{16}$  is equivalent to
- A.**  $(36.506)_8$  **B.**  $(36.206)_8$   
**C.**  $(35.506)_8$  **D.**  $35.206_8$
- 37 A string insulator has 4 units. The voltage across the bottom most unit is 33.33% of total voltage. Its string efficiency is
- A.** 25% **B.** 33.33%  
**C.** 66.66% **D.** 75%
- 38 A power system has a maximum load of 15 MW. Annual load factor is 50%. The reserve capacity of plant is \_\_\_\_\_ if the plant capacity factor is 40%.
- A.** 3.75 MW **B.** 7.75 MW  
**C.** 46.75 MW **D.** 8.75 MW
- 39 Find the final value of the function  $F(s)$  given by  $(s-1)/(s(s^2-1))$
- A.** 1 **B.** 0  
**C.** -1 **D.**  $\infty$
- 40 Which of the following systems is time invariant?
- A.**  $y(t) = x(2t) + x(t)$  **B.**  $y(t) = x(t) + x(1-t)$   
**C.**  $y(t) = -x(t) + x(1-t)$  **D.**  $y(t) = x(t) + x(t-1)$