

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

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**  
(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY,  
THIRUVANANTHAPURAM)

**SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 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 The impulse response of an RL circuit is a.....
- A.** Rising exponential function      **B.** Decaying exponential function
- C.** Step function      **D.** parabolic function
- 2 The maximum power that can be transferred to the load resistor  $R_L$  from the voltage source in Fig 4 is

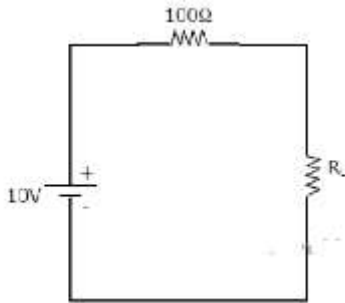


Fig 4

- A.** 1 W      **B.** 10 W
- C.** 0.25 W      **D.** 0.5 W
- 3 The rated voltage of a three-phase power system is given as
- A.** rms phase voltage      **B.** Peak phase voltage
- C.** rms line to line voltage      **D.** Peak line to line voltage
- 4 For the given information  $Z_{11} = 3$ ,  $Z_{12} = 1$ ,  $Z_{21} = 2$ ,  $Z_{22} = 1$ . Find the value of  $Y_{21}$ .
- A.** 2      **B.** -2
- C.** 1      **D.** -1
- 5 Norton's theorem states that a complex network connected to a load can be replaced with an equivalent impedance
- A.** In series with current source      **B.** In parallel with a voltage source
- C.** In series with a voltage source      **D.** In parallel with a current source
- 6 A network contains linear resistors which are connected in series across an ideal voltage source. If all the resistances are halved and the voltage is doubled then the voltage across each resistor becomes.
- A.** Doubled      **B.** Halved
- C.** Not changed      **D.** None of the above

- 7 An alternator supplying power to a load with a leading power factor always has \_\_\_\_\_ voltage regulation
- A.** Positive **B.** Negative  
**C.** Unity **D.** zero
- 8 In an autotransformer, power from the primary is transferred to the secondary.
- A.** Inductively **B.** Conductively  
**C.** Both A and B **D.** None of the above
- 9 Starting torque of an Induction Motor will be maximum when its slip at.....
- A.** 0 **B.** 0.5  
**C.** 1 **D.** 2
- 10 The voltage regulation of an alternator depends on .....
- A.** Load current only **B.** Power factor only  
**C.** Both load current and pf **D.** None of the above
- 11 The rotor windings of Induction motors are skewed to.....
- A.** Rising exponential function **B.** Decaying exponential function  
**C.** Step function **D.** parabolic function
- 12 When the rotor of a three phase induction motor is blocked, the slip is.....
- A.** 0 **B.** 0.5  
**C.** 0.1 **D.** 1
- 13 The advantage of using a dual slope ADC in a digital Voltmeter is that
- A.** Its accuracy is high **B.** Its conversion time is small  
**C.** Its gain output in BCD form **D.** It does not require a comparator
- 14 Which one of the following follows the combinational logic type
- A.** Demultiplexer **B.** Multiplexer  
**C.** Both A,B **D.** None
- 15 Which of the following is NOT a combinational circuit?
- A.** Multiplexer **B.** Decoder  
**C.** Flip-flop **D.** Encoder
- 16 Using which of the following decimal digit can be converted into the binary format?
- A.** Multiplexer **B.** Decoder  
**C.** Flip-flop **D.** Encoder
- 17 A gate in which all inputs must be low to get a high output is called a/an
- A.** NAND **B.** NOR  
**C.** AND **D.** XOR
- 18 Race round condition can be avoided in digital logic circuits using
- A.** Shift registers **B.** Full adder  
**C.** Master slave JK FF **D.** AND gates
- 19 Which one of the following law is helpful to determine the most economical size of the electric power transmission line conductor ?
- A.** Ohms Law **B.** Kirchoff's Laws  
**C.** Faradays Law **D.** Kelvin's Law

- 20 The connected load of a consumer is 2kW and its maximum demand is 1.5kW. The load factor of the consumer is  
**A.** 0.75 **B.** 0.375  
**C.** 1.33 **D.** None of the above
- 21 The surge impedance of 50 miles long underground cable is 25 ohms. For a 25 miles long length it will be:  
**A.** 12.5 ohms **B.** 25 ohms  
**C.** 50 ohms **D.** None of the above
- 22 In case of a HVDC system, there is  
**A.** Charging current but no skin effect **B.** No charging current but skin effect  
**C.** Neither charging current nor skin effect **D.** Both charging current and skin effect
- 23 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
- 24 Transmission lines are transposed to  
**A.** Reduce copper loss **B.** Reduce skin effect  
**C.** Prevent interference with the neighbouring telephone lines **D.** Prevent short circuit between any two lines
- 25 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
- 26 Sinusoidal signals multiplied by decaying exponentials are referred to as  
**A.** Amplified sinusoids **B.** Neutralised sinusoids  
**C.** Buffered sinusoids **D.** Damped sinusoids
- 27 Find the Z-transform of  $x(n) = u(-n-2)$ .  
**A.**  $\frac{z^2}{z-1}$  **B.**  $\frac{z^2}{1-z}$   
**C.**  $\frac{z^2}{1+z}$  **D.**  $\frac{z^2}{2-z}$
- 28 Discrete time signal is derived from continuous time signal by \_\_\_\_\_ process.  
**A.** Addition **B.** Multiplication  
**C.** Sampling **D.** Addition and multiplication
- 29 Find the Fourier transform of an exponential signal  $f(t) = e^{-at} u(t)$ ,  $a > 0$ .  
**A.**  $\frac{1}{a + jw}$  **B.**  $\frac{1}{a - jw}$   
**C.**  $\frac{1}{-a + jw}$  **D.**  $\frac{1}{-a - jw}$

- 30 What is the consequence of marginally stable systems?
- |  |           |   |
|--|-----------|---|
| <b>A.</b> The system will turn out to be critically damped | <b>B.</b> | The system will be an overdamped system |
| <b>C.</b> It will be a damped system                       | <b>D.</b> | Purely oscillatory system               |

**PART B**

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

- 31 The magnitude of current (in mA) through the resistor R2 in the Fig 10 shown is \_\_\_\_\_.

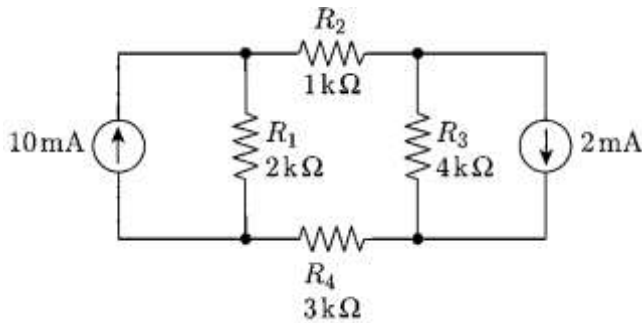
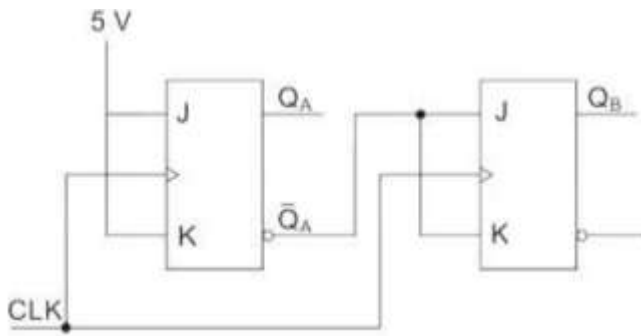


Fig 10

- |                  |           |        |
|------------------|-----------|--------|
| <b>A.</b> 3.3 Ma | <b>B.</b> | 1.8 mA |
| <b>C.</b> 0.2 mA | <b>D.</b> | 2.8 mA |
- 32 In a 3-phase system,  $V_{YN} = 100\angle -120^\circ$  V and  $V_{BN} = 100\angle 120^\circ$  V. Then  $V_{YB}$  will be
- |                                  |           |                         |
|----------------------------------|-----------|-------------------------|
| <b>A.</b> $170\angle 90^\circ$ V | <b>B.</b> | $173\angle -90^\circ$ V |
| <b>C.</b> $200\angle 60^\circ$ V | <b>D.</b> | $100\angle 90^\circ$ V  |
- 33 A 220V DC machine has an armature resistance of  $1\Omega$ . If the full load current is 20A, the difference in the induced voltage when the machine is running as a motor, and as a generator is.....
- |               |           |     |
|---------------|-----------|-----|
| <b>A.</b> 20V | <b>B.</b> | 0V  |
| <b>C.</b> 40V | <b>D.</b> | 50V |
- 34 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.....
- |                   |           |            |
|-------------------|-----------|------------|
| <b>A.</b> Unity   | <b>B.</b> | 0.707 lead |
| <b>C.</b> 0.6 lag | <b>D.</b> | Zero       |

- 35 The current state QA QB of a two JK flip-flop system is 00. Assume that the clock rise-time is much smaller than the delay of the JK flip-flop. The next state of the system is



- A. 00                                      B. 01  
C. 11                                      D. 10
- 36 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
- 37 A generating station has a connected load of 50 MW and a maximum demand of 20 MW. No. of units generated is 60 MWhr for the year. What is the demand factor?
- A. 0.33    B. 0.4  
C. 2.5    D. 3
- 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 A periodic function  $f(t)$ , with a period of  $2\pi$ , is represented as its Fourier series

$$f(t) = a_0 + \sum_{n=1}^{\infty} a_n \cos nt + \sum_{n=1}^{\infty} b_n \sin nt.$$

$$If f(t) = \begin{cases} A \sin t, & 0 \leq t \leq \pi \\ 0, & \pi \leq t \leq 2\pi \end{cases}$$

the Fourier series coefficients  $a_1$  and  $b_1$  of  $f(t)$  are,

- A.  $a_1 = 0; b_1 = A/\pi$                       B.  $a_1 = \frac{A}{2}; b_1 = 0$   
C.  $a_1 = 0; b_1 = \frac{A}{2}$                          D.  $a_1 = \frac{A}{\pi}; b_1 = 0$
- 40 How far does the memory of the given system  $y[n] = 1/2\{x[n] + x[n-1]\}$  extend into past?
- A. Two time unit                                B. One time unit  
C. Three time unit                                D. Not predictable