

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**COMMON TO BME ,ECE & EEE**

**DIFFERENTIAL EQUATIONS AND TRANSFORMS**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

1 Solve  $(D^2 - 1)(D + 2)y = 0$

2 Find  $y$  given  $\frac{d^2y}{dx^2} - 4y = 6e^{5x}$

3 Define the Laplace transform of Periodic function

4 Find  $L^{-1}\left[\frac{1}{s-3} + \frac{1}{s} + \frac{s}{s^2-4}\right]$

5 Find the constant  $a_0$  of the Fourier series for function  
 $f(x) = x$  in  $0 \leq x \leq 2\pi$

6 If  $f(x) = |x|$  expanded as a Fourier series in  $-\pi < x < \pi$ . Find  $a_0$

7 State Parseval's identity for Fourier transforms

8 Find the Fourier sine transform of  $\frac{1}{x}$

9 Define Unit impulsive function of Z transforms

10 Find  $Z\left[\frac{a^n}{n!}\right]$

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

11 a. Solve  $(D^3 + 3D^2 + 3D + 1)y = 5 + \cos 2x$

OR

b. Solve  $(x^2D^2 + 3xD + 1)y = \frac{\sin(\log x)}{x^2}$

12 a. (i) Find  $L(t \cos^3 t)$

(ii) Find the Laplace transform of  $\frac{\sin at}{t}$

OR

b. (i) Find  $L^{-1}\left[\log \frac{s-a}{s^2+a^2}\right]$

(ii) Find  $L^{-1}\left[\frac{s}{(s^2-a^2)^2}\right]$

13 a. Solve  $y'' + y = 2e^t$  Where  $y(0) = 1, y'(0) = 2$   
 using Laplace transform

OR

b. Express  $f(x) = (\pi - x)^2$  as a Fourier series of  
 period  $2\pi$  in the Interval  $0 < x < 2\pi$

14 a. Obtain the cosine series for the function  
 $f(x) = \cos x$  in  $(0, \pi)$ .

OR

b.

Find the Fourier Sine series for the function  $f(x) = x$

in  $0 < x < \pi$  and hence deduce that  $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$

15 a.

Find the Fourier Transform of  $f(x)$  given by

$$f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a > 0 \end{cases}$$

Hence evaluate the value of the integral  $\int_0^{\infty} \frac{\sin x}{x} dx$

OR

b.

(i) Find Fourier cosine transform of  $f(x) = \begin{cases} \cos x & \text{if } 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$

(ii) Find the Fourier sine transform of  $3e^{-4x} + 4e^{-3x}$

16 a.

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

OR

b.

(i) Find the inverse Z-transform of  $F(z) = \frac{1}{1-az^{-1}}, |z| > |a|$

using power series method.

(ii) Find  $Z^{-1} \left[ \frac{Z-4}{(Z+2)(Z+3)} \right]$

17 a.

Find  $Z^{-1} \left[ \frac{z^2}{z^2+4} \right]$  using Residue theorem

OR

p.t.o

b. Find  $Z^{-1}\left[\frac{3z^2 - 18z + 26}{(z-2)(z-3)(z-4)}\right]$  by the method of partial fraction.

18 a. Solve the equation  $(D^3 + 2D^2 + D)y = e^{2x} + \sin x$

OR

b.

(i) Find  $L[t^2 e^{3t} \sinh t]$  (ii) Find  $L\left[\frac{1 - \cos t}{t}\right]$

Answer ALL questions

PART-C (2 x 15 = 30)

19 a.

(i) Solve  $\frac{d^2 y}{dx^2} + 4\frac{dy}{dx} + 4y = e^{-x} \sin 2x$

(ii) Solve  $(D^3 - 3D^2 + 3D - 1)y = x^2 e^x$

OR

b.

Find the Laplace transform of  $f(t) = \begin{cases} \sin \omega t, & 0 < t < \frac{\pi}{\omega} \\ 0, & \frac{\pi}{\omega} < t < \frac{2\pi}{\omega} \end{cases}$

with  $f\left(t + \frac{2\pi}{\omega}\right) = f(t)$

20 a.

Find the Fourier series expansion of period  $2\pi$  for the function  $y = f(x)$  which is defined in  $(0, 2\pi)$  by means of the table of value given below. Find the series up to the third harmonic

$x$	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	$\pi$	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$	$2\pi$
$y$	1.0	1.4	1.9	1.7	1.5	1.2	1.0

OR

b.

Using Parseval's identity calculate

$$(i) \int_0^{\infty} \frac{dx}{(x^2 + a^2)^2}$$

$$(ii) \int_0^{\infty} \frac{x^2 dx}{(x^2 + a^2)^2} \text{ if } a > 0$$

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SL.NO:1353

SL.NO:1366

SUBJECT CODE:17EEEC13

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**ELECTIVE - SPECIAL ELECTRICAL MACHINES**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Differentiate between holding torque and detent torque.
- 2 What are the assumptions made in derivation of emf equation for PMSM?
- 3 Compare synchronous reluctance motor and induction motor.
- 4 Draw the torque-angle characteristics of synchronous reluctance motor.
- 5 Define Slewing.
- 6 Write down the torque equation for a switched reluctance motor.
- 7 Sketch the C-dump converter circuit for SRM.
- 8 Mention the applications of PMSM.
- 9 List the types of permanent magnet materials used in PMDC motor.
- 10 What is electronic commutator?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Briefly explain the control circuit of synchronous reluctance motor.  
**OR**  
b. Drive the expression for linear analysis of stepper motor performance.
- 12 a. Describe the microprocessor based control in switched reluctance motor with a neat block diagram.  
**OR**  
b. Explain in detail about armature reaction emf in permanent magnet synchronous motor
- 13 a. Explicate the emf equation of permanent magnet synchronous motor  
**OR**  
b. Explicate the working principle of synchronous reluctance motor with neat sketch.
- 14 a. Elaborate the construction and working of variable reluctance synchronous.

**OR**

**(P.T.O)**

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b. Illustrate the principle of operation and constructional feature of hybrid stepping motor.

15 a. Draw and explain the static characteristic of stepping motor..

**OR**

b. Explain the construction and working of rotary switched reluctance motor with neat sketch.

16 a. Elaborate classic converter for switched reluctance motor.

**OR**

b. Briefly explain about the constructional features of permanent magnet synchronous motor.

17 a. Draw and explain the phasor diagram of permanent magnet synchronous motor.

**OR**

b. Illustrate converter volt-ampere requirements in detail.

18 a. Describe the sensor less control of BLDC motors with neat sketch.

**OR**

b. Write the comparison between BLDC motor and induction motor.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. A three – phase, 230 V, 60Hz, 4 pole, star – connected reluctance motor has  $X_{sd} = 22.5 \Omega$  and  $X_{sq} = 3.5 \Omega$ . The armature resistance is negligible. The load torque is  $T_L = 12.5\text{N-m}$ . The voltage to frequency ratio is maintained constant at rated value. If the supply frequency is 60 Hz, Determine (a) torque angle (b) the line current (c) The input power factor.

**OR**

b. Elucidate sensor less control of switched reluctance motor.

20 a. Describe the microprocessor based control of PMSM with a neat block diagram & list out its advantages.

**OR**

b. Explicate the principle of operation of PMBLDC motor with necessary diagrams.

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SL.NO:1366

SL.NO:1339

SUBJECT CODE:17EECC04

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**MEASUREMENTS AND INSTRUMENTATION**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Point out the types of power factor meter.
- 2 Illustrate electronic counter
- 3 Describe about the Dynamic characteristics of an instrument.
- 4 Describe creeping in Energymeter.
- 5 State the applications of X-Yrecorder
- 6 Define load cell
- 7 State an example of Piezo-electric Transducer.
- 8 Write any two precautions to be taken while using an Ammeter.
- 9 Explain about X-Y recorders.
- 10 Define the working principle of a strain gauge.

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Interpret the statistical evaluation of measurement data in measurement System.  

**OR**

b. Examine the working of attraction type and repulsion type moving iron instruments with neat diagrams.
- 12 a. Illustrate the working of successive approximation type DVM with neat circuit diagram.  

**OR**

b. Compute the operation of Wheatstone Bridge with a neat Sketch ..
- 13 a. With neat diagram Illustrate the principles of CRT displays with neat diagram .  

**OR**

b. Illustrate the Principle operation of Capacitive Transducer.List out the advantage and disadvantage.

(P.T.O)



14 a. Illustrate the construction and working of a Thermocouple with its advantages and disadvantages.

**OR**

b. Describe the types of Instrumental errors with suitable example.

15 a. Describe the construction of bar type current transformer.

**OR**

b. Explain the general block diagram of measurement system.

16 a. With neat diagram explain the principles of multi range ammeters.

**OR**

b. Explain the operation of Multiple range Potentiometer with a neat Sketch .

17 a. Explain the operation of Anderson's Bridge with a neat Sketch .

**OR**

b. How does a magnetic recording device works? Explain.

18 a. Explain the operating principles of LCD displays and also state the advantages of LCD displays over LED displays?

**OR**

b. Explain the principles of photo electric transducers with neat diagram.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Derive the torque equation of electro-dynamometer type instrument.

**OR**

b. Examine the operation of magneto-strictive transducer With neat diagram

20 a. Describe the construction and functioning of mechanical type frequency meter.

**OR**

b. Explain the operating principle of a LVDT. Also derive its equation.

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SL.NO:1332

SUBJECT CODE:17EECC06

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
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**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**POWER ELECTRONICS**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Define Rectifier.
- 2 List the applications of a CSI.
- 3 IGBT is a voltage-controlled device. Why?
- 4 Power BJT is a current controlled device. Why?
- 5 What is phase control?
- 6 Mention the importance of bridge Circuit.
- 7 What is parallel inverter?
- 8 What is meant by TRC?
- 9 Mention the different types of chopper with respect to commutation process.
- 10 Define multistage sequence control.

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Illustrate the analysis of single phase full bridge inverter.  
**OR**  
b. Elucidate in detail of single phase full controlled converter with appropriate circuit and waveforms for R Load in  $\alpha > 90^\circ$  conduction mode.
- 12 a. Draw and discuss the v-i characteristics of a p-n junction.  
**OR**  
b. Explain in detail about thyristor protection.
- 13 a. Explain the construction and various Modes of operation of TRIAC.  
**OR**  
b. A Three-phase 3 pulse SCR controlled converter feeds an RL load with a freewheeling diode across the load. Discuss how freewheeling diode comes into play when supply voltage is passing through zero and becoming negative.

- 14 a. (i) Distinguish between half controlled converter and fully controlled converter.  
(ii) Compare single phase and Three phase converter.

**OR**

- b. Elaborate  
(i) Basic series inverter.  
(ii) High frequency series inverter.

- 15 a. Explain in detail about McMurray Bedford half bridge inverter.

**OR**

- b. What is pulse width modulation technique? Elaborate various PWM techniques.

- 16 a. Describe in detail about the operation of step down chopper with RL load in continuous and discontinuous mode.

**OR**

- b. Explain in detail about load commutated chopper with suitable diagram and waveforms.

- 17 a. (i) Draw and explain the block diagram of switching mode regulator with its necessary diagrams.  
(ii) Write short notes on Resonant Switching.

**OR**

- b. Enumerate the concept of Buck Boost Regulator with its necessary diagrams.

- 18 a. Illustrate in detail about the operation of step-up cycloconverter.

**OR**

- b. Explain in detail about circulating current mode operation of cycloconverter.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

- 19 a. Explain how two 3-phase full converters can be connected back-to-back form a circulating current type of dual converter. Discuss its operation with the help of voltage waveforms across (a) each converter (b) load and (c) reactor.

**OR**

- b. Explain the construction and operational details of MOSFET with its characteristics.

- 20 a. Explicate in detail about McMurray full bridge inverter with neat sketch.

**OR**

- b. Explain in detail about three phase to three phase bridge cycloconverter with necessary waveforms.

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SL.NO:1320

SUBJECT CODE:17EECC05

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
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**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTRICAL MACHINES - II**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 What is the role of primary resistors in the squirrel cage motor starters?
- 2 Define voltage regulation of an alternator.
- 3 What is synchronous motor?
- 4 List out the starting methods of a synchronous motor.
- 5 Mention the types of 3 phase -induction motor.
- 6 Define synchronous speed and relative speed.
- 7 Describe the importance of slip power recovery scheme.
- 8 Which type of motor is used in ceiling fan?
- 9 What is step angle?
- 10 Write down the equation of starting and running torque of an induction motor.

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Explain clearly how synchronous motor can be used as a synchronous condenser. Draw the phasor diagram.  

**OR**

  - b. Explain the procedure of calculating resistances of various steps of a rotor resistance starter
- 12 a. List the difference between salient type and non salient types of rotor construction  

**OR**

  - b. Describe the expression for the pitch factor and distribution factor.
- 13 a. Explain the Starting methods of a synchronous motor with its necessary sketches  

**OR**

  - b. Describe the different torques of synchronous motor.

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14 a. Develop an expression for the power developed in synchronous motor.

**OR**

b. Explain the relation between torque and rotor power factor.

15 a. Sketch and explain the typical torque-slip characteristics of a three phase induction motor.

**OR**

b. Draw the power flow diagram of a three phase induction motor and explain all the stages

16 a. Explicate the construction and principle working of an autotransformer starter with its essential diagrams.

**OR**

b. Explain V/f control of an induction motor

17 a. Explain briefly about stator resistance starter with its necessary diagrams.

**OR**

b. Draw and explain the operational details of single phase shaded pole induction motor.

18 a. Discuss the principle operation of stepper motor with neat sketches and state the merits and demerits of the same

**OR**

b. Compare variable reluctance motor with permanent magnet stepper motor

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. How to obtain the V-curve and inverted V-curve of synchronous motor at constant input power? Explain.

**OR**

b. Draw and explain the Construction and operational details of a Synchronous Generator with its advantage and disadvantage and to derive the relation between the frequency and number of poles.

20 a. Draw and explain the construction and operational details of an induction motor

**OR**

b. Describe the principle operation of induction generator with its essential diagrams.

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**SL.NO:1320**

SL.NO:1312

SUBJECT CODE:17EECC01

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
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**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTRIC CIRCUIT ANALYSIS**

(Candidates admitted under 2017 Regulations-SCBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 State ohms law.
- 2 Define power factor.
- 3 State Norton's theorem.
- 4 How to change the current source into voltage source?
- 5 What is mean by Resonance?
- 6 State Quality factor
- 7 Give the relation connecting the power factor angle with the two wattmeter readings
- 8 Define line current and phase current
- 9 Define transient response.
- 10 Define time constant of RC circuit

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

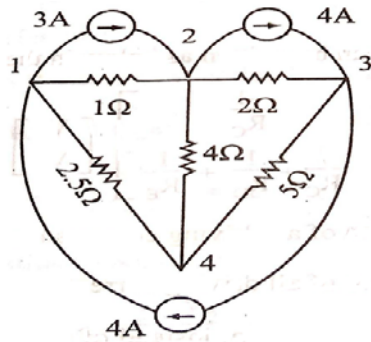
- 11 a. Derive the expression for total resistance when three resistors are connected in series and when they are connected in parallel

**OR**

- b. Write short notes on
- |                                   |                                  |
|-----------------------------------|----------------------------------|
| a) Active & Passive Element       | b) Lumped & Distributed elements |
| c) Bilateral & Unilateral element | d) Linear & non-linear elements  |

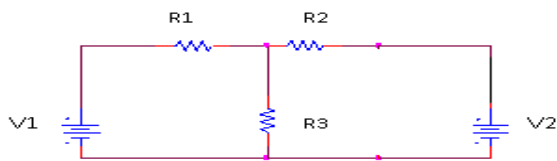
**P.T.O**

- 12 a. Frame the nodal equations of the network shown in fig. and hence find the difference of potential between nodes 2 and 4.



OR

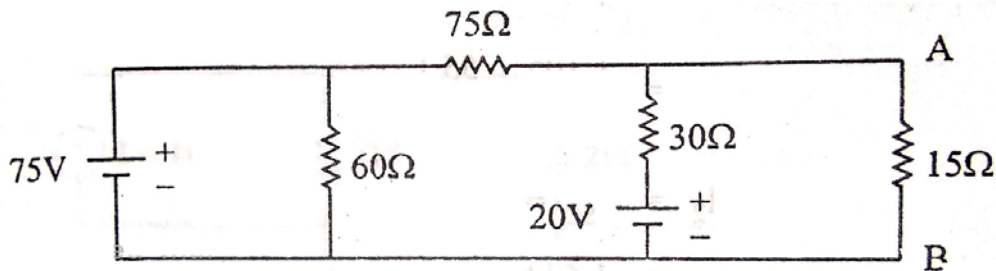
- b. Find the equivalent circuit by using Norton's theorem across the load resistor R3



- 13 a. Write short notes on (a) Star to Delta conversion  
(b) Delta to Star conversion

OR

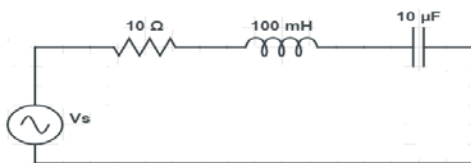
- b. Find the voltage across the 15 ohm resistor using Norton's theorem for the circuit given below .



- 14 a. Find the expression for resonant frequency in RLC series circuit.

OR

- b. For the circuit shown in fig, determine the impedance at resonant frequency, 10 Hz above resonant frequency and 10 Hz below resonant frequency.



- 15 a. A coil having a resistance of  $50 \Omega$  and an inductor of  $0.2 \text{ H}$  is connected in series with a variable capacitor across a  $60 \text{ V}$ ,  $50 \text{ Hz}$  supply. Calculate the capacitance required to produce resonance and the corresponding values of (a) current (b) voltage across the coil and the capacitor (c) the power factor (d) Q-factor.

**OR**

- b. Explain three phase power measurement by 3ammeter and 3 volt meter method.
- 16 a. Two wattmeter method is used to measure power in a 3 phase load, the wattmeter readings are  $400 \text{ W}$  and  $-35 \text{ W}$ . Calculate (i) total active power (ii) power factor and (iii) reactive power

**OR**

- b. Derive the expression for total power in a 3 phase balanced star connected system.
- 17 a. A resistance  $R$  and a  $2 \text{ micro farad}$  capacitor are connected in series across a  $200 \text{ V}$  direct supply. Across the capacitor is a neon lamp that strikes at  $120 \text{ V}$ . calculate  $R$  to make the lamp strike  $5 \text{ Sec}$  after the switch has been closed. If  $R=5 \text{ M ohm}$ , how long will it take the lamp to strike.

**OR**

- b. A RL series circuit excited by a sinusoidal source  $e(t)=10 \sin 100t$  volts, by closing the switch at  $t=0$ . Take  $R=10 \Omega$  and  $L=0.1 \text{ H}$ . Find the current flowing through the RL circuit.
- 18 a. Write short notes on a) Natural response b) Forced response

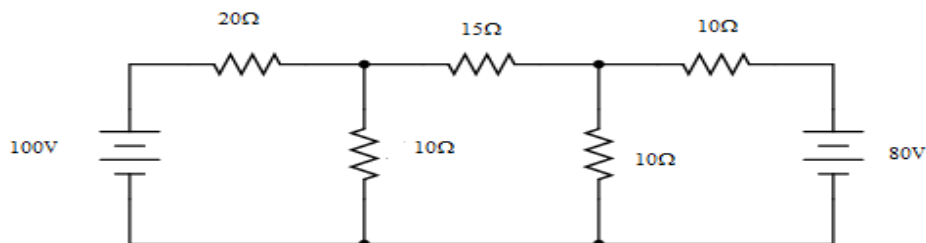
**OR**

- b. Give the short notes on (a) co-efficient of coupling (b) dot convention

**Answer ALL questions**

**PART-C (2 x 15 = 30)**

- 19 a. Using nodal method estimate the current through the branch  $15 \Omega$  resistor.



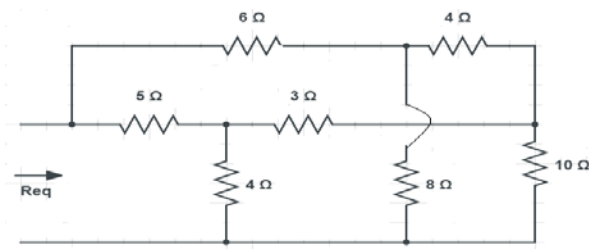
**OR**

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**SL.NO:1312**



- b. Determine the equivalent resistance by using star – delta transformation.



- 20 a. A current source is applied to a parallel combination of R, L & C, where  $R = 10\ \Omega$ ,  $L = 1\text{H}$ , &  $C = 1\ \mu\text{F}$
- Compute the resonant frequency.
  - Find the quality factor.
  - Calculate the value of the bandwidth.
  - Compute the lower and upper half frequency points of the band width.

**OR**

- b. Derive the transient current response of series RLC circuit for DC input  
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**SL.NO:1312**

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
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**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTIVE-MATHEMATICAL MODELLING AND SIMULATION**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Compare static and dynamic linking.
- 2 Define MBLOCK palette.
- 3 Define the term manipulation.
- 4 Express the command to insert the legend in the plotted graph
- 5 List out the commands used to export the file from SCILAB.
- 6 List out the draw backs of SCILAB.
- 7 Plot the elliptic surface in 3D with example
- 8 State pre-defined variables.
- 9 What are the tools used in Graphic window
- 10 Write Short note on the function 'load' and 'save'

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. A 230V, 50HZ, 1 phase AC supply given with transformer ratio 0.25 and the secondary of the transformer connect to diode in series with 200  $\Omega$  Resistor. Find the output current , PIV, Output frequency.  

**OR**
- b. Derive a basic sine functions of phasor representation. Mention the parameters of variable declaration for sine, cosine functions.
- 12 a. Derive the expression with suitable program of Average value and RMS value for sinusoidal function  

**OR**
- b. Describe the Capacitor discharge function through a resistor and write a suitable program with discharge function chart.
- 13 a. Develop a SCILAB to find Peak value of following given input voltage  $V_{input} = 300V$ ,  $V_{max}$  at output = 50V.  $T = 0.05$ microseconds, time constants provide by the circuit is  $250 \times 10^{-6}$  seconds.

2

**OR**

b. Elaborate different parameters of plot function in SCILAB.

14 a. Explain Graphic User Interface (GUI) with an applications.

**OR**

b. Explain briefly about how to declare a function? With example.

15 a. Explain short notes on (i) Variable (ii) Constants (iii) functions (iv) Matrices

**OR**

b. Explain the different tools of control system and its applications.

16 a. Explain the operational procedure of state space control of the system.

**OR**

b. Explain with a suitable program to plot the contour of the following function  $f(x_1, x_2) = x_1^2 + x_2^2$ .

17 a. Find out the DC load current for the 24V DC connected in series with 20k $\Omega$  resistor connected in 1kilo ohm Resistor. Write a program to express  $I_L$ .

**OR**

b. Implement a program to find the determinant to the following  
 $A = [4 \ 0 \ -7 \ 3 \ -5; \ 0 \ 0 \ 2 \ 0 \ 0; \ 7 \ 3 \ -6 \ 4 \ -8; \ 5 \ 0 \ 5 \ 2 \ -3; \ 0 \ 0 \ 9 \ -1 \ 2]$ .

18 a. State and explain dot product of vector function with suitable example.

**OR**

b. State the role of intersci. Explain briefly about the functional concept of intersci with suitable example.

**Answer ALL questions**

**PART-C (2 x 15 = 30)**

19 a. (a) Give a detailed explanation about Ordinary Differential Equations and define a ODE Calling function. (b) solve the equation  $dy/dt=A*y$ .

**OR**

b. Examine the Basic commands used to operate a graphic window with example

20 a. How to define and solve Polynomials basic functions in SCILAB? Explain with example

**OR**

b. Write a program to plot (i) Piecewise linear (ii) Logarithmic scale(s) (iii) Piecewise constant (iv) Vertical bar plot

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SL.NO:1303

SL.NO:1299

SUBJECT CODE:17EEPI03

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
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**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELE-VIRTUAL INSTRUMENTATION**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Derive the expressions for dual slope integrator.
- 2 Write the mathematical expressions for ADC.
- 3 What is inter channel delay?
- 4 What do you mean by multiplexing in data acquisition system?
- 5 What is MOD Bus?
- 6 Draw the block diagram of VI.
- 7 Write the different types of sequence structures.
- 8 What is correlation?
- 9 What is the need for power spectrum analysis?
- 10 How VI is used in power spectrum analysis?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Describe are the features of a typical on board DAQ card.  
**OR**  
b. Explain briefly the use of timer-counter on the universal DAQ card.
- 12 a. Write a short note on the following:  
a.RS-485 b.RS -232  
**OR**  
b. Explain in detail about the bus protocol of CAN Bus.
- 13 a. With an example write the concepts of Sub VI.  
**OR**  
b. Write short notes on display tools provided in Lab VIEW.
- 14 a. Write simple applications using fourier transform.  
**OR**  
b. Draw the functional diagram of dual slope ADC and its output waveform .Give the detailed explanation.

p.t.o

15 a. Explain in detail the representation of analog signals in digital domain.

**OR**

b. How is PC interfaced with external instruments using RS-232?

16 a. Write simple applications for indicating temperature using Virtual Instrumentation.

**OR**

b. List out the various types of A/D Converters and Explain in detail about the operation of any one converter.

17 a. Explain the quantization technique in amplitude and time axes.

**OR**

b. Explain case and sequence structures in detail using Lab – view software.

18 a. Write short notes on

(a) Clusters and graphs                      (b) VIs and sub VIs.

**OR**

b. With an example explain the PID control of a process using Virtual Instrumentation.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. What is called sampling? Write short notes on Sample and Hold.

**OR**

b. Draw and explain about Simple temperature Indicator.

20 a. With a neat sketch explain Labview.

**OR**

b. Draw and explain ON/OFF controller.

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SL.NO:1299

SL.NO: 1290

SUBJECT CODE:17EECC11

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**SOLID STATE DRIVES**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Give some applications of D.C. drives.
- 2 What are the disadvantages of constant torque loads?
- 3 Give the advantages of synchronous motor.
- 4 Give the advantages of switched reluctance motor.
- 5 Define friction Torque.
- 6 What is called continuous and discontinuous conduction?
- 7 Elucidate energy efficient drive.
- 8 Which machine is said to be self-controlled?
- 9 What is meant by BLDC motor?
- 10 What is switched reluctance motor?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Derive the equations governing motor load dynamics from the basic principles.  
**OR**  
b. Explain the operation of a single phase fully controlled converter fed separately excited DC motor with neat waveforms.
- 12 a. A 6MW 3 Phase 11kV star connected 6 pole 50Hz 0.9 lagging power factor synchronous motor has synchronous reactance equal to  $9\Omega$  and armature resistance equal to  $10\Omega$ . The rated field current is 50 A. The machine is controlled by variable frequency control at constant V/F ratio up to the base speed and at constant voltage above base speed. Determine
  - i. Torque and field current for the rated armature current, 750 rpm and 0.8 leading power factor
  - ii. Armature current and power factor for half the rated motor torque, 1500 rpm and rated field current.

**OR**

(p.t.o)

- b. Write briefly about:  
(i) Different types of electric drive with examples.  
(ii) Choice and selection factors of electric drives.

13 a. Discuss the different modes of operation of an electrical drive.

**OR**

- b. Explain the motoring and braking operation of three phase fully controlled rectifier control of DC separately excited motor with aid of diagrams and waveforms. Also obtain the expression for motor terminal voltage and speed.

14 a. Write brief notes on

- a) Time - ratio Control  
b) CLC Control of chopper circuit

**OR**

- b. How is the stator voltage controlled in induction motor? Explain with the essential diagrams.

15 a. Explain the operation of closed loop control of induction motor drives.

**OR**

- b. Enumerate the schemes of CSI fed induction motor drives with its essential diagrams.

16 a. Explain the closed loop control scheme of adjustable speed synchronous motor drive.

**OR**

- b. Elucidate the operation of v/f control of multiple synchronous motors with schematic diagram.

17 a. What are advantages and disadvantages of PMSM?

**OR**

- b. Describe the sensor less control of BLDC motors with neat sketch.

18 a. Explain the construction and principle of operation of VR stepping motor.

**OR**

- b. Explain the constructional features and principle of operation of SRM.

**(p.t.o)**  
**Sl.No.1290**

**3**

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Explain about parts of electrical drives and classification of electrical drives.

**OR**

b. Discuss about Two Quadrant Type A and Two Quadrant Type B Chopper Drives.

20 a. Discuss in detail about Voltage source inverter fed synchronous motor.

**OR**

b. Briefly explain about magnetic circuit analysis on open circuit of BLDC motor.

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**Sl.No.1290**



SL.NO: 1282

SUBJECT CODE:17EECC02

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTRICAL MACHINES - I**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Why the dc motor is mostly gear motor?
- 2 What is polarity test of a transformer?
- 3 Interpret how EMF is induced in a conductor
- 4 What is the role of inter-pole in a dc machine?
- 5 List the various applications of DC generators.
- 6 Illustrate the characteristics of a DC shunt motor
- 7 Compare core and shell type transformer.
- 8 What is leakage reactance of transformers?
- 9 What is difference between cumulative and differential compound wound motors?
- 10 What is an auto transformer?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Discuss in detail about the application of dc generators.  
**OR**  
b. Describe in detail about the energy efficiency of transformer and all-day efficiency is always less than that of commercial efficiency, why?
- 12 a. Derive an expression for generated voltage of ac winding.  
**OR**  
b. Explain about reluctance torque in rotating machines.
- 13 a. Explain about various types of rotating electrical machines.  
**OR**  
b. Explain in detail the process of commutation in a DC generator.

(p.t.o)

14 a. Describe the internal and external characteristics of DC compound generators with neat sketches.

**OR**

b. Derive the torque equation of DC motor.

15 a. Organize the methods of controlling the speed of a DC shunt motor.

**OR**

b. Derive the equation for maximum power output of dc motor.

16 a. List out the applications of various types of dc motor.

**OR**

b. Give the conditions for parallel operation of three phase transformers and explain various types of three phase transformer connections.

17 a. Explain about parallel operation of transformer.

**OR**

b. Explain Swinburne's test for a D.C machine.

18 a. Explain in detail about the retardation test.

**OR**

b. Explain about brake test of dc shunt motor.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Explain the process of EMF build-up in a DC generator. Discuss the roles of critical speed and critical resistance.

**OR**

b. Describe about the four-point starter of a DC motor and compare it with three point starter. Give the advantages and drawbacks.

20 a. A lap wound D.C generator has 8 poles, 120 slots with 8 conductors in each slot. Flux per pole is 0.04 Wb. Find (a) Induced emf generated at 600 RPM. (b) What should be speed at rotation if induced emf is to be 500 V.

**OR**

b. A 220 V DC motor takes an armature current of 40 Amperes and runs at 1500 RPM. The resistance of the armature is 0.05 Ohm. a) Determine the torque developed b) if the torque is increased by 25% more than above value, determine the new current drawn and the speed. Assume in both cases the field current remains constant.

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**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**POWER SYSTEM ANALYSIS**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions

**Part-A (10 x 2 =20 Marks)**

- 1 What is power system analysis?
- 2 List the components of power system.
- 3 What is Jacobian matrix?
- 4 Write the most important mode of operation of power system and mention the major problems encountered with it.
- 5 Write the relative frequency of occurrence of various types of faults.
- 6 List out the differences in representing the power system for load flow and short circuit studies.
- 7 Define negative sequence impedance.
- 8 Write the boundary condition in single line to ground fault.
- 9 State transient stability.
- 10 What is meant by steady state stability limit?

Answer **Any FIVE** questions

**Part-B (5 x10 =50 Marks)**

- 11 a. **A  $3\phi Y - \Delta$  transformer is constructed using three identical  $1\phi$  transformer of rating 200 KVA, 63.51kV/11kV transformer. The impedances of primary and secondary are  $20+j 45 \Omega$  and  $0.1 +j 0.2 \Omega$  respectively. Calculate the p.u impedance of the transformer**

(P.T.O)

OR

b.

(i) A generator is rated 500 MVA, 22 kV, Y – connected winding has a reactance of 1.1 p.u. Find the ohmic value of the reactance of winding

(ii) if the generator is working in a circuit for which the base are specified as 100 MVA, 20 kV, Then find the p.u. value of reactance of generator winding on the specified base

12 a. Sketch a flow chart for a load flow solution by NR method. Also mention its advantages and disadvantages.

OR

b.

A 1250 kVA, 5000 V generator with  $X_d'' = 0.08 \text{ p.u}$  supplies a purely resistive load of 1000 kW at rated voltage. The load is connected directly across the terminals of the generator. If all the three phases of the load are short circuited simultaneously find initial symmetrical short circuit current in the generator.

13 a.

A generator is connected through a circuit breaker to a transformer. The ratings of the generator are 100MVA, 18 kV,  $X_d'' = 19\%$  and  $X_d' = 26\%$   $X_d = 130\%$ . The transformer ratings are 100 MVA, 240/18kV, Y- $\Delta$ , X=10% with 18kV on  $\Delta$ side. If a three phase short circuit occurs on the high tension side of a transformer at rated voltage and no load, find

(a) Initial symmetrical rms current in the transformer winding on the high tension side.

(b) Initial symmetrical rms current in the line on the low tension side.

OR

b.

The symmetrical components of phase – a voltage in a 3- phase unbalanced system are  $V_{a0} = 10 \angle 180^\circ \text{ V}$ ,  $V_{a1} = 50 \angle 0^\circ \text{ V}$  and  $V_{a2} = 20 \angle 90^\circ \text{ V}$ . Determine the phase voltage  $V_a, V_b,$  and  $V_c$ .

14 a. What is meant by sequence impedance? Explain the sequence network of generator.

OR

(P.T.O)

SL.NO:1277

- b. Derive the Power Angle Equation.
- 15 a. Derive swing equation for a synchronous machines.

OR

- b. Derive an expression for critical clearing angle and clearing time.
- 16 a. A synchronous generator and motor are rated for 30,000kVA, 13.2 kV and both have sub transient reactance of 20%. The line connecting them has a reactance of 10% on the base of machine ratings. The motor is drawing 20,000 kW at 0.8p.f leading. The terminal voltage of the motor is 12.8 kV. When a symmetrical three phase fault occurs at motor terminals, find the sub transient current in the motor, generator and at the fault point.

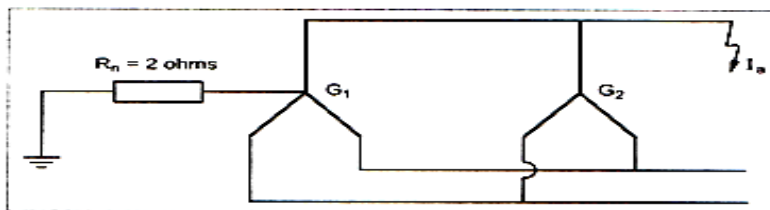
OR

- b. Two 11 KV, 20 MVA, three phase, star connected generator operate in parallel as shown in given figure; the positive, negative and zero sequence reactance's of each being, respectively,  $j0.18$ ,  $j0.15$ ,  $j0.10$  p.u. The star point of one of the generators is isolated and that of the other is earthed through a  $2.0 \Omega$  resistor. A single line to ground fault occurs at the terminals of one of the generators.

Estimate (i) the fault current.

(ii) Current in grounding resistor, and

(iii) The voltage across grounding resistor.



- 17 a. Briefly explain the importance of stability analysis in power system planning and operation.

OR

- b. Write short notes on assumptions made in deducing equal area criterion.

(P.T.O)  
SL.NO:1277

18 a.

Write a short note on the following:

- (i) Positive sequence components.
- (ii) Negative sequence components.
- (iii) Zero sequence components.

**OR**

- b. Explain the procedure for load flow solution by NR method.

**Answer ALL questions**

**PART-C (2 x 15 = 30)**

- 19 a. What is the need for system analysis in planning and operation of power system? Explain.

**OR**

- b. With a neat flow chart explain the computational procedure for load flow solution using fast decoupled method when the system contains all types of buses.

20 a.

A generator is connected through a transformer to a synchronous motor the sub transient reactance of generator and motor are  $0.15 \text{ p.u.}$  and  $0.35 \text{ p.u.}$  respectively. The leakage reactance of the transformer is  $0.1 \text{ p.u.}$  All the reactances are calculated on a common base. A three phase fault occurs at the terminals of the motor when the terminal voltage of the generator is  $0.9 \text{ p.u.}$  The output current of generator is  $1 \text{ p.u.}$  and  $0.8 \text{ p.f.}$  leading. Find the sub transient current in  $\text{p.u.}$  in the fault, generator and motor. Use the terminal voltage of generator as reference vector.

**OR**

- b. Derive swing equation used for stability studies in power system.

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SL.NO:1275

SUBJECT CODE:17EEEC18

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**ELECTIVE - RENEWABLE ENERGY TECHNOLOGY**

Time : Three Hours

Maximum Marks:100 Marks

**Answer ALL questions**  
**Part-A (10 x 2 =20 Marks)**

- 1 Define global warming?
- 2 List any two solar cell material
- 3 Define LVRT?
- 4 Define life cycle of the battery
- 5 What is meant by primary and secondary Energy source? Give example.
- 6 What are the two types of instrument used for solar radiation measurement?
- 7 What is Permanent magnet Generator?
- 8 Describe Remote monitoring system?
- 9 State the advantages of dc chopper drives.
- 10 What do you meant by flywheel energy storage?

**Answer Any FIVE questions**  
**Part-B (5 x10 =50 Marks)**

- 11 a. Determine the power coefficients of windmills.  
**OR**  
b. Compare how the converter power output and controller characteristics are related.
- 12 a. Briefly explain about the working principle of solar energy  
**OR**  
b. Discuss about the principle and working of Solar heating and solar Cooling system.
- 13 a. Explain the working principle of Solar Desalination process.  
**OR**  
b. Enumerate the different types of concentrating type collectors
- 14 a. Briefly Explain About Grid Tied PV systems.  
**OR**

**(P.T.O)**

b. Describe the different methods of energy storage system and explain the solar energy storage system.

15 a. Write short notes on AC-DC converters.

**OR**

b. Explain in detail about Off-Grid Solar System.

16 a. Elucidate the procedure for designing a battery.

**OR**

b. Discuss in detail about the working principle of ultra capacitors with a neat sketch

17 a. What are the advantages and limitations of wave energy conversion?

**OR**

b. Discuss the different types of turbines used for hydroelectric projects with diagram.

18 a. With neat circuit diagram explain the configuration of buck converter

**OR**

b. Explain about Single phase half uncontrolled full bridge rectifier

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Classify and explain the different losses that lead to the less efficiency of a Solar cell.

**OR**

b. Write short notes on different types of solar energy collectors with neat diagrams.

20 a. Discuss in detail about Boost converter.

**OR**

b. Discuss in detail about Single phase uncontrolled half wave rectifier.

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SL.NO:1264

SUBJECT CODE:17EESE09

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**ELE-CONVENTIONAL AND ALTERNATE ENERGY SYSTEMS**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 List two nuclear power plant in India
- 2 What is hydraulic turbine
- 3 Give examples for reaction turbine.
- 4 What are the most favourable sites for installing wind turbines?
- 5 List the applications of fuel cell.
- 6 Comment on environmental effect of fuel cell
- 7 Compare open cycle and closed cycle gas turbine plant
- 8 Compare on-shore and off-shore wind power plants.
- 9 How is geo thermal energy produced?
- 10 Compare MHD generation with Fuel cell

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Give the detailed application of fuel cell as in case of electrical vehicles and portable power systems  
**OR**  
b. Discuss the various factors to be considered while selecting the site for nuclear power station
- 12 a. Explain the safety features adopted in a nuclear power plant  
**OR**  
b. Illustrate PV system components with neat diagrams and mention the use of each component
- 13 a. Explain the working of a closed cycle OTEC plant  
**OR**  
b. Explain the working of a Floating type bio gas digester
- 14 a. Justify the conversion of internal combustion engine using conventional fuel to work on hydrogen as fuel. p.t.o

2

**OR**

b. Explain in detail how coal is converted to electricity in a thermal power plant with neat diagram.

15 a. Illustrate a general layout of a thermal power plant and explain its various stages

**OR**

b. Explain the advantages of super critical boiler over critical boilers

16 a. Give a general block diagram of a hydro power plant and discuss its operation

**OR**

b. Draw the diagram depicting the parts of a horizontal axis wind turbine explain the brief role of each part

17 a. With a neat diagram, explain how wind energy can be converted into electrical energy

**OR**

b. Discuss the construction and working of a single basin tidal power generation

18 a. What is a solid acid fuel cell? Explain its working.

**OR**

b. Explain the construction and working of a MHD generator in open cycle

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Compare the working of various OTEC systems with neat diagrams and necessary explanations.

**OR**

b. Construct on-grid and an off-grid solar PV installation and compare their working with the merits and demerits

20 a. With neat sketch explain the detailed layout of a thermal power plant with various stages.

**OR**

b. Illustrate the working of a horizontal and vertical axis wind turbine mentioning its various parts and their operation.

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SL.NO:1264

SL.NO:1259

SUBJECT CODE:17SASE01

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELE -ENERGY CONSERVATION AND MANAGEMENT**

Time : Three Hours

Maximum Marks:100 Marks

**Answer ALL questions**  
**Part-A (10 x 2 =20 Marks)**

- 1 What are non-renewable energy sources ?
- 2 What are the various grades of energy with an example
- 3 Define utilization factor.
- 4 What is the affect of sulphur in coal when used in boiler?
- 5 What is heat to power ratio for a cogeneration application?
- 6 What do you mean by energy audit?
- 7 What circumstances need investments for energy conservation in any plant?
- 8 what are energy conversion method in Boilers?
- 9 Why 'induction motors' are so popular over all types of motors?
- 10 List out different costs involved in the process of implementing energy management.

**Answer Any FIVE questions**  
**Part-B (5 x10 =50 Marks)**

- 11 a. Write short notes on: (a) Thermodynamic steam traps (b) Thermostatic steam traps.  
**OR**  
b. Briefly explain the essential elements of monitoring and targeting System.
- 12 a. Write a short note on Indian energy scenario  
**OR**  
b. Briefly explain the tariff structure of HT billing.
- 13 a. Write short notes on motor efficiency computation.  
**OR**  
b. What are the factors to be considered while selecting a motor?
- 14 a. Define energy conservation and energy efficiency. How do an Industry, nation and globe work would benefit from energy efficiency program?  
**OR**  
b. Mention different energy saving tips in pumps,fan and compressors

p.t.o

15 a. Explain the importance of furnace draft and its control.

**OR**

b. During April-2003, the plant has recorded a maximum demand of 600 kVA and average PF is observed to be 0.82 lag, The minimum average PF to be maintained is 0.92 lag as per the independent utility supplier and every one % dip in PF attracts a penalty of Rs 10,000/in each month.

16 a. Mention some of the long-term energy strategies available for the better energy secured nation?

**OR**

b. What are the effects of harmonics on motor operation and performance?

17 a. What is the function of 'draft' in a boiler? Enumerate the different types of draft available for a boiler?

**OR**

b. What are the rules for the selection of an air conditioner to save energy? Explain in detail.

18 a. List steps involved in 'detailed energy audit'.

**OR**

b. Describe about 5 items each of responsibilities and duties of Energy Manager as assigned under The Energy Conservation Act, 2001.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Draw the block diagram and explain the basic elements of an electric drive system.

**OR**

b. Mention some of the long-term energy strategies available for the better energy secured nation?

20 a. Write the checklist of good maintenance practices for proper motor operation.

**OR**

b. Explain the need for an Energy policy.

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SL.NO:1259

SL.NO:1252

SUBJECT CODE:17EESE06

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTIVE - NON CONVENTIONAL ENERGY SOURCE AND ITS**  
**APPLICATIONS**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 List three non-conventional energy sources of Power generation in India.
- 2 Define solar incident angle.
- 3 Define the diffuse radiation.
- 4 Define tip-speed ratio.
- 5 Defines bio-mass.
- 6 List the types of materials available for bio-gas.
- 7 List the advantages of tidal power plant.
- 8 Show any four differences between renewable and non renewable sources
- 9 Write the expression for power output of wind turbine.
- 10 Write the classification of Tidal power plants

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Develop the working of solar heaters with neat diagram.  
**OR**  
b. Develop a block diagram and explain the operation of open cycle MHD system.
- 12 a. Appraise the operation of solar cooling with neat diagram.  
**OR**  
b. Summarize the conventional and unconventional energy sources? Describe briefly.
- 13 a. Define solar constant and list the reasons for variation in solar radiation reaching the earth than received at the outside of the atmosphere.  
**OR**  
b. Define solidity factor ( $\sigma$ ) of wind ratio and explain the effect of  $\lambda$  (speed ratio) on  $\sigma$ . Explain the importance of these factors in selecting a rotor for wind power plant.

**P.T.O**

2

14 a. Explain the utilization of geothermal energy for electricpower Generation.

**OR**

b. Explain renewable energy sources in brief with reference to Indian context.

15 a. Explain the different strategies for meeting the future energy requirements in national scenario.

**OR**

b. Illustrate the solar flat plate collectors and explain its operation.

16 a. Explain the working of solar driers with neat diagram.

**OR**

b. Explain how the wind energy data are collected and energy available in the wind is estimated.

17 a. Illustrate with neat sketches, the working of a horizontal axis wind turbine generator .

**OR**

b. Explain briefly how prime movers for geo thermal energy conversion are classified and elaborate it.

18 a. Compare in detail the advantages and disadvantages of Geo-thermal energy.

**OR**

b. Explain the concept of hydrogen as alternative fuel for vehicles.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Analyse the environmental impact of wind energy generation.

**OR**

b. Analyse the relative advantage and limitations of tidal power plant. What is the method adopted to supply continuous power supply?

20 a. Compare renewable and conventional energy systems with suitable exaamples.

**OR**

b. Illustrate with neat circuit diagram and explain the principle and operation of vapor dominated geothermal power plant.

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**SL.NO:1252**

SL.NO:1243

SUBJECT CODE:17EECC12

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**PROTECTION & SWITCHGEAR**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Write the classification of circuit breaker based on the medium used for arc extinction.
- 2 Define current setting.
- 3 Tabulate the difference between current relay and current differential relay.
- 4 Shortly explain about the earth-fault protection of an alternator.
- 5 Describe blast effect.
- 6 Restate the function of arc shield in vacuum circuit breaker.
- 7 Tabulate the advantages and disadvantages of cross-blast type.
- 8 Define surge diverter.
- 9 Shortly explain about making capacity.
- 10 Shortly explain about the Ferranti surge absorber.

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Derive an equation for torque developed in an induction relay.  
**OR**  
b. How does earthing screen and ground wire provide protection against direct lightning strokes?
- 12 a. Explain the function of a protective relay in an electrical system.  
**OR**  
b. With a neat diagram explain the construction and working principle of induction type directional power relay.
- 13 a. Describe distance protection scheme for the protection of feeders with neat diagram.  
**OR**  
b. Describe the construction and working of a Buchholz relay.

**P.T.O**

2

14 a. Explain in detail about the Earth-fault protection for alternator.

**OR**

- b. Discuss the time graded over current protection for
- i) Radial feeder
  - ii) Parallel feeders
  - iii) Ring main system

15 a. Briefly explain about short time rating.

**OR**

- b. Briefly discuss about circuit breaker rating and current zero method

16 a. Explain breaking capacity and making capacity.

**OR**

- b. Discuss the principle operation of an air blast circuit breaker. What are the advantages and disadvantages of using air as the arc quenching medium?

17 a. Describe briefly plain explosion pot and forced blast oil circuit breaker.

**OR**

- b. Explain the types of air blast circuit breaker.

18 a. Describe the mechanism of lightning discharge with neat diagram.

**OR**

- b. Shorty explain about the following surge diverter:
- a) Rod gap diverter
  - b) Horn gap diverter
  - c) Expulsion gap type diverter

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Illustrate the Modified Differential Protection scheme of an alternator.

**OR**

- b. Build the Surge protection system for electrical apparatus.

20 a. With neat sketch explain in detail about Current chopping and capacitive current breaking.

**OR**

- b. Describe in detail about Minimum oil circuit breaker.



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**SL.NO:1243**





SL.NO:1217

SUBJECT CODE:17EEES04

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTRIC MACHINERY**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Power factor of transformer is low under no load, why?
- 2 How the synchronous machines differ from induction machine?
- 3 Why the motor is called as a universal motor?
- 4 List out the classification of electrical machines.
- 5 Define transformer.
- 6 Write the necessity of starter.
- 7 What are the losses take place in induction motor?
- 8 What is PMSM?
- 9 Mention the applications of BLDC motor.
- 10 What is the purpose of yoke?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. How the autotransformer is differed from two winding transformer?  
**OR**  
b. Draw and explain the principle of operation of two point starter.
- 12 a. Does the change in excitation affect the p.f of the synchronous motor? Explain.  
**OR**  
b. Explain the operation of PMBLDC motor.
- 13 a. Derive the expression for field energy and co –energy in multiple excited systems.  
**OR**  
b. Derive the EMF Equation of a DC machine.

(p.t.o)

2

14 a. Describe in detail about singly excited system.

**OR**

b. Explain the Efficiency of transformer.

15 a. Explain the effects of Cogging and Crawling in Machines.

**OR**

b. Mention the advantages, disadvantages and applications of Switched reluctance motor.

16 a. Explain with neat diagram the concept of MMF space wave single coil.

**OR**

b. Describe the importance of equivalent circuit.

17 a. Briefly explain the speed control methods of DC shunt motor.

**OR**

b. Explain the equivalent circuit of induction motor with its necessary illustrations.

18 a. Briefly explain the Necessity of starter and speed control.

**OR**

b. Briefly explain the construction and principle of operation of servo motor.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Explain magnetic and electric circuit with neat sketch.

**OR**

b. Distinguish Single and Multiple excited systems.

20 a. Describe with a neat sketch, the principle and working of a star –delta starter for a 3-phase induction motor.

**OR**

b. Draw and explain the construction and operational details of Synchronous motor with its advantage and disadvantage.

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**SL.NO:1217**

SL.NO:1214

SUBJECT CODE:17EEEC16

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTIVE - ELECTRIC VEHICLES**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Derive an expression for Slip.
- 2 Describe the DC motor drive including the power electronics and battery source.
- 3 Write short notes on Runtime battery model.
- 4 What is an electric vehicle?
- 5 Define Average roadway percent grade.
- 6 Define an Electric machine.
- 7 Mention the two Speed control methods of an Induction motor.
- 8 What do you mean by Deterministic rule based method.
- 9 Draw Planetary Gear Set.
- 10 Explain the electrical equivalent circuit of a Three phase Induction machine.

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Explain SRM. List its advantages and disadvantages.  
**OR**
- b. Explain the Cross section of a simple Induction motor.
- 12 a. With a neat sketch explain the Cross-section of three phase SRM.  
**OR**
- b. Explain Electromechanical brake system.
- 13 a. Write short notes on Permanent Magnet Machines.  
**OR**
- b. Explain Hybrid Electric Vehicle Transmission.

(p.t.o)

2

14 a. What is Secondary Energy?

**OR**

b. What is an Electrolyte?

15 a. Draw the speed torque characteristics of SRM drive.

**OR**

b. Give any two drawbacks of SRM motor.

16 a. What is known as Drive line?

**OR**

b. Define Gear ratio.

17 a. What is parallel control?

**OR**

b. What is a Battery?

18 a. Define Load-levelling concept.

**OR**

b. Explain the speed-torque characteristics of an Induction motor .

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. What are the three types of Modal control strategies? Explain any one of them.

**OR**

b. Explain electric only mode of operation of Hybrid Electric Vehicles.

20 a. Explain Planetary gear set.

**OR**

b. What do you mean by transmission in a power train?

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**SL.NO:1214**

SL.NO:1207

SUBJECT CODE:17EEEC05

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**ELECTIVE - FLEXIBLE AC TRANSMISSION SYSTEM**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 List the different types of SVC.
- 2 What are the advantages of TCSC?
- 3 What are the problems with interconnected power systems?
- 4 Define Static VAR compensator.
- 5 Define damping.
- 6 What is the need of Voltage limits of TCSC?
- 7 How TCSC is modeled for various reactance model?
- 8 What are the basic operation modes of UPFC?
- 9 Define steady state Interactions.
- 10 What are the main control schemes of FACTS controllers?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Briefly describe the way by which the transient stability is enhanced due to static var compensator.  

**OR**

b. Discuss the TCSC modeling for steady state and dynamic stability studies.
- 12 a. Explain series compensation and shunt compensation with necessary equivalent circuits and phasor diagrams.  

**OR**

b. What are the different parameters to control power flow in ac systems given their relative importance ?
- 13 a. Explain the objectives of the FACTS controllers in the power system network.  

**OR**

b. Explain the principle of reactive power compensation at the midpoint of the Transmission line.
- 14 a. Discuss in detail about various configuration of SVC with relevant schematic.

p.t.o



2

**OR**

b. Explain the different applications of SVC in detail.

15 a. Compare fixed series and fixed shunt compensation

**OR**

b. Explain the various applications of Thyristor Controlled Series Capacitor (TCSC) in detail.

16 a. Illustrate the various applications of TCSC for improvement of the power stability limit.

**OR**

b. Explain the basic construction, principle of operation of STATCOM with neat sketch.

17 a. Explain briefly about the comparative features of STATCOM with SVC.

**OR**

b. Explain different modes of operation of UPFC with relevant phasor diagram in detail.

18 a. Investigate the SVC-SVC controller interaction in a large power system.

**OR**

b. Explain briefly about the FACTS POD controller.

**Answer ALL questions**

**PART-C (2 x 15 = 30)**

19 a. Elaborate the modelling of TCSC for various power system stability studies with necessary circuits.

**OR**

b. Elaborate in detail about compensated and uncompensated transmission lines.

20 a. Illustrate the basic construction, working and characteristics of any one type of SVC.

**OR**

b. Explicate the SVC dynamic control interaction between multiple SVC's in large power system with neat sketch.

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SL.NO:1207

SL.NO:1194

SUBJECT CODE:17EEEC04

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**EHV AC & DC POWER TRANSMISSION**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 What are the advantage of EHV AC transmission?
- 2 What are the sources of audible noise generation in HV transmission systems?
- 3 Define 'short transmission line'.
- 4 How to improve power handling capacity of long lines?
- 5 What is attenuation and distortion of travelling waves?
- 6 How does the over voltage surge affect the power system?
- 7 Define transformer tap changing
- 8 Draw the diagram of radial MTDC
- 9 List the types of static generators for AC-DC power flow.
- 10 How will you protect against dc line faults?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Give HVDC and EHVAC lines in india.  
**OR**  
b. Discuss about the advantages and disadvantages of DC transmission .
- 12 a. Mention the need of going for EHV AC transmission.  
**OR**  
b. What are the advantage and disadvantage of HVDC transmission?
- 13 a. Explain tuning of power line.  
**OR**  
b. Briefly expalin about the series line compensation.
- 14 a. Give the short notes on compensation of transmission lines.  
**OR**  
b. Draw the cross sectional view of non linear resistor lightning arrester (valve type) and explain its operation in detail and its V-I characteristics

p.t.o

- 15 a. Write short notes on:  
(i) Rod gaps used as protective devices  
(ii) Ground wires for protection of overhead lines.

**OR**

- b. Explain briefly about expulsion type arrester
- 16 a. Explain the effect of overlap angle on the performance of converter circuit .

**OR**

- b. Explain the analysis of 12 pulse converter with bridge rectifier.
- 17 a. Explain in detail about current regulation from the inverter side
- OR**
- b. Explain the principle of steady state frequency control of AC network by asynchronous HVDC power flow control.

- 18 a. Explain the principle of stabilisation of parallel AC transmission.

**OR**

- b. Draw a block diagram of damping control system added to HVDC power control system.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

- 19 a. Express the relation between the DC output voltage & AC line voltage (rms) and rating of the converter transformer with Graetz's converter circuit.

**OR**

- b. Explain by means of a schematic and equations ,how power flow through an HVDC link is controlled.
- 20 a. State the advantages and disadvantages of dc transmission system with following economics, reliability, performance..

**OR**

- b. Explain the method in matching the DC voltage and DC current in 2 terminals of an HVDC system.

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SL.NO:1183

SUBJECT CODE:17EECC07

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**TRANSMISSION AND DISTRIBUTION**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Distinguish between attenuation and phase constant.
- 2 State primary and secondary transmission.
- 3 List any four applications of mutual GMD.
- 4 Define voltage regulation of a transmission line.
- 5 List out the methods to improve string efficiency.
- 6 List the methods of laying underground cables.
- 7 List out the advantages of the ring distributor over radial system.
- 8 List the various types of line supports.
- 9 Define ferranti effect.
- 10 Classify distribution system.

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. A conductor composed of seven identical copper strands each having a radius 'r'. Find the self GMD of the conductor.

**OR**

- b. A short 3 phase transmission line with an impedance of  $(6+j8) \Omega$  per phase has sending and receiving end voltages of 120kV and 110kV respectively for some receiving end load at a pf of 0.9pf lagging. Determine power output and sending end power factor.
- 12 a. Determine the efficiency and regulation of a 3-phase, 100 Km, 50 Hz transmission line delivering 20 MW at a power factor of 0.8 lagging and 66 kV to a balanced load. The conductors are of copper, each having resistance  $0.1\Omega/\text{km}$ , 1.5 cm outside dia, spaced equilaterally 2 meters between centres. Use nominal T method.

**OR**

- b. Using the nominal –  $\pi$  method, find the sending end voltage and voltage regulation of a 250km, three phase, 50Hz transmission line delivering 25 MVA at 0.8 lagging power factor to a balanced load at 132 kV. The line conductor resistance is 0.11 ohm/km and its effective diameter is 1.6 cm. Neglect leakage reactance.

p.t.o

- 13 a. Determine the expression for sag in overhead transmission line.  
(i) When supports are at equal levels. (ii) When supports are at unequal levels.

**OR**

- b. A single core cable of conductor diameter 2.0 cm and lead sheath of diameter 5.3 cm is to be used on a 66k V, 3 phase system. Two intersheaths of diameter 3.1 cm and 4.2 cm are used in between them to obtain uniform distribution of stress. Find the voltages at which the two intersheaths are maintained if the maximum stress in the layers is same.

- 14 a. State and prove Kelvin's law for size of conductor for transmission. Discuss its limitations.

**OR**

- b. Obtain the expression for the capacitance of a single phase two wire line .

- 15 a. Explain the classification of transmission lines with their characteristics.

**OR**

- b. Identify the problems in voltage distribution over a string of insulators.

- 16 a. Classify underground cables. Explain the construction of any one type with a neat diagram.

**OR**

- b. Explain double bus –bar bypass isolator in substation with neat diagram.

- 17 a. Explain in detail the different methods of neutral grounding.

**OR**

- b. Draw and explain the structure of a typical AC power system network.

- 18 a. Compare EHVAC and HVDC transmission considering both economic and technical aspects.

**OR**

- b. Sketch and explain the methods of laying of underground cables.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

- 19 a. Explain the classification of transmission lines with their characteristics.

**OR**

- b. Derive the inductance of three phase double circuit line by  
(1) Symmetrical spacing. (2) Unsymmetrical spacing.

- 20 a. Discuss the various types of cables used for three phase services. Explain the construction of any one type with a neat diagram.

**OR**

- b. Explain the types of bus-bar arrangements used in sub-stations with suitable diagram.

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SL.NO:1174

SUBJECT CODE:17EECC08

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**CONTROL SYSTEMS**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

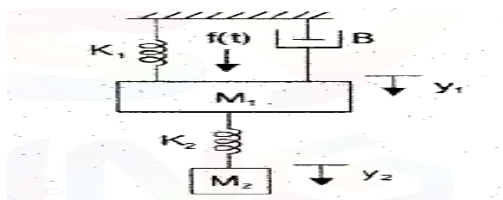
- 1 State the Order of a system.
- 2 Define Rise time and Settling time.
- 3 Define Gain Margin.
- 4 Define unstable system.
- 5 List any two methods for finding state transition matrix.
- 6 Define Transmittance.
- 7 Why Derivative Controller is not used in Control Systems?
- 8 What is Phase Margin?
- 9 What do you mean by relative stability?
- 10 Define periodic sampling

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Using Routh criterion, determine the stability of the system represented by the characteristics equation,  $s^4+8s^3+18s^2+16s+5 = 0$ . Comment on the location of the roots of characteristics equation.

**OR**

- b. Find the transfer function  $Y_1(s)/F(s)$  shown in the fig

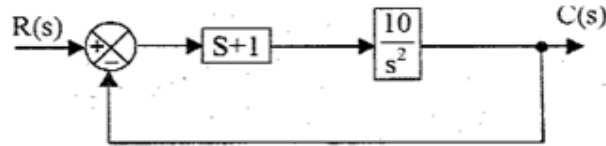


P.T.O

- 12 a. Derive the expression for response of critically damped second order system using unit step input.

**OR**

- b. Determine the unit step response of the system shown in the fig



- 13 a. Discuss in detail about the determination of gain margin and phase margin from polar plot.

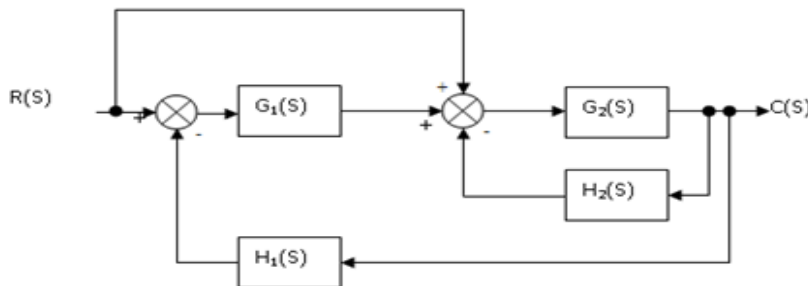
**OR**

- b. Drive the equation of phase angle of lag compensator.

- 14 a. Discuss the various steps involved in constructing the Root Locus.

**OR**

- b. Convert the block diagram to signal flow graph and determine the transfer function using mason's gain formula.



- 15 a. Consider the standard closed loop transfer function of the second order system given below  $G(s) = \omega_n^2 / (s^2 + 2\zeta\omega_n s + \omega_n^2)$ . write a MATLAB program to find the unit step response for various values of natural frequency of oscillation  $\omega_n$ . take damping ratio  $\zeta = 0.4$

**OR**

- b. A unity feedback control system has an open loop transfer function ,  $G(s) = K / (s^2 + 4s + 13)$  sketch the root locus.

- 16 a. Explain the terms used in signal flow graph and write Mason's Gain formula

**OR**

- b. Discuss in detail about PI, PD and PID controllers.

3

- 17 a. Discuss in detail about the importance of controllability and observability of the control system model in the design of the control system.

OR

- b. Briefly explain about Jury's stability test

- 18 a. Write the procedure for bode plot.

OR

- b. Write the procedure for polar plot.

**Answer ALL questions**

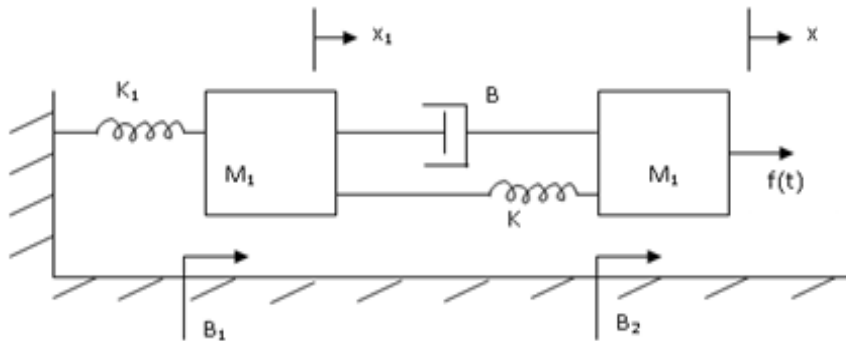
**PART-C (2 x 15 = 30)**

- 19 a. A unity feedback system has open loop transfer function  $G(s) = 20/s(s+2)(s+5)$  using Nichols chart, determine the closed loop frequency response and estimate  $M_r, \omega_r, \omega_b$

OR

- b. Consider a unity feed back system having open loop transfer function  $G(S) = 1/S^2(1+S)(1+2S)$  using polar plot find the gain and phase margin.

- 20 a. Write the differential equations governing the mechanical translational system shown in fig. and determine the transfer function.



OR

- b. Discuss in detail about the procedure of deriving the state space representation of a system whose dynamics has been expressed in the form of a differential equation.

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SL.NO:1174



**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**HUMANITIES & SCIENCES**

**ENGINEERING MATHEMATICS**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

1

Obtain the characteristic equation of  $\begin{pmatrix} 2 & -3 & 1 \\ 3 & 1 & 3 \\ -5 & 2 & -4 \end{pmatrix}$

2

Define orthogonal matrices.

3

Define evolute.

4

Find the centre of curvature of the curve  $y = x^2$  at the origin.

5

If  $u = x^2 y^3$  where  $x = \log t$  and  $y = e^t$  Find  $\frac{du}{dt}$ 

6

Examine the maximum and minimum values of  $3x^2 - y^2 + x^3$ 

7

Integrate  $\int_0^1 \int_1^2 x(x+y) dy dx$ .

8

Integrate  $\int_0^{\pi/2} \int_0^{\pi/2} \sin(\theta + \phi) d\theta d\phi$ 

9

Prove that  $\nabla(r^n) = nr^{n-2} \vec{r}$ 

10

State Stoke's theorem

(p.t.o)

Answer Any FIVE questions

Part-B (5 x10 =50 Marks)

11 a.

Find the Eigen values and Eigenvectors of the matrix  $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{pmatrix}$ .

OR

b.

Obtain the Eigen values and Eigenvector of the matrix  $\begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{pmatrix}$

12 a.

Obtain the equation to the circle of curvature of the curve  $xy = c^2$  at  $(c, c)$ .

OR

b.

Prove that the radius of curvature at any point of the cycloid

$$x = a(\theta + \sin \theta); y = a(1 - \cos \theta) \text{ is } 4a \cos \frac{\theta}{2}$$

13 a.

Find the maximum and minimum values of the function  $x^3 y^2 (1 - x - y)$

OR

b.

(i) If  $u = \sin^{-1} \frac{x}{y} + \tan^{-1} \frac{x}{y}$ , then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$

(ii) Find  $\frac{du}{dt}$  as a total derivative and verify the result by the direct substitution of  $u = x^2 + y^2 + z^2$  when  $x = e^{2t}$ ,  $y = e^{2t} \cos 3t$ , and  $z = e^{2t} \sin 3t$

14 a.

Integrate  $\int_0^a \int_0^{\sqrt{a^2-x^2}} \int_0^{\sqrt{a^2-x^2-y^2}} \frac{dz dy dx}{\sqrt{a^2-x^2-y^2-z^2}}$

OR

(p.t.o)

Sl.No.17MABS01

- b. Obtain the area enclosed by the parabola  $y^2 = 4ax$ ,  $x$ -axis and the latus rectum of the parabola.

15 a.

If  $\vec{F} = x^2\vec{i} + xy\vec{j}$  evaluate  $\int \vec{F} \cdot d\vec{r}$  from  $(0, 0)$  to  $(1, 1)$  along the line  $y=x$

OR

b.

Obtain the values of  $a$  and  $b$  so that the surfaces  $ax^3 - by^2z = (a+3)x^2$  and  $4x^2y - z^3 = 11$  may cut orthogonally at  $(2, -1, -3)$

16 a.

Find the volume bounded by the cylinder  $x^2 + y^2 = 4$  and the planes  $y + z = 4$  and  $z = 0$ .

OR

b.

For the given curve  $x = a \cos \theta, y = b \sin \theta$  Find  $\rho$  at  $\left(\frac{a}{\sqrt{2}}, \frac{b}{\sqrt{2}}\right)$

17 a.

Obtain the equation to the circle of curvature of the curve  $xy = c^2$  at  $(c, c)$ .

OR

b.

Prove that the radius of curvature at any point of the cycloid

$$x = a(\theta + \sin \theta); y = a(1 - \cos \theta) \text{ is } 4a \cos \frac{\theta}{2}$$

18 a.

Prove that  $\nabla^2 (r^n) = n(n+1)r^{n-2}$  where  $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$  and  $r = |\vec{r}|$

OR

(p.t.o)

Sl.No.17MABS01

- b. For the curve  $x^3 + y^3 = 2$  find the co-ordinates of the centre of curvature at the point (1, 1)

**Answer ALL questions**  
**PART-C (2 x 15 = 30)**

19 a.

Diagonalise the matrix  $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$  and hence find  $A^5$

**OR**

- b. Obtain the equation of the evolute of the curve  $x^{2/3} + y^{2/3} = a^{2/3}$

20 a.

Determine the value of  $\int_0^1 \int_0^{\sqrt{x^2}} (x^2 + y^2) dy dx$

**OR**

- b. Change the order of integration in  $\int_0^a \int_y^a \frac{x^2}{\sqrt{x^2 + y^2}} dx dy$  and then evaluate it.

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**SL.NO:1165**

SL.NO:1160

SUBJECT CODE:17EECC19

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
  
**ROBOTICS AND AUTOMATION**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 What is meant by gripper?
- 2 Is it useful for static robot system of Euler –Lagrangian formulation?
- 3 Write down the basic components of robot analyser?
- 4 What is meant by playback robot?
- 5 What is the function of the planning tasks?
- 6 List the different models of robots.
- 7 Compare Electronic and pneumatic manipulator
- 8 Define -Coordinate frames
- 9 What is the function of the Motion profiles?
- 10 What are the basic configurations of space analysis of a 6 axis?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Derive the expressions for two torques ( $T_1$  &  $T_2$ ) developed by a two link arm.  
**OR**  
b. Explain Description of links and joints, Denavit-Hartenberg (DH) notation
- 12 a. Discuss the different characteristics of forces and equivalent torques for joints of two link planar robot arm.  
**OR**  
b. Explain the three basic laws of robotics proposed by Asimov's & different types of robots
- 13 a. Explain about robot dynamics with compensation for gravity & robot arm dynamics.  
**OR**  
b. Describe the function of Dynamic model: Euler –Lagrangian formulation
- 14 a. What are the various inputs to joints of two link planar robot arm  
**OR**  
b. Explain the function of Graph search and potential field path planning

p.t.o

15 a. Explain the various Performance characteristics of industrial Robots. Mobile robot locomotion with neat sketch.

**OR**

b. Discuss the relative merits and demerits of different textual robot languages. Explain the different program instructions

16 a. Explain the geometric based direct kinematic analysis of articulated robot

**OR**

b. Discuss the various inputs to an Forward and inverse dynamic model for two DOF planar manipulator.

17 a. Write the homogenous transform matrix for a rotation of  $90^\circ$  about the z axis followed by a rotation of  $-90^\circ$  about the axis, followed by a translation of ( 3,7,9 )

**OR**

b. Explain the different characteristics of d planning tasks, Joint space techniques robot arm.

18 a. Elucidate on General Programming Language with suitable example.

**OR**

b. Explain the various drawbacks in space analysis.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Compare the various attributes of robot with those of human being. Explain a robot structure with a sketch.

**OR**

b. List the advantages and disadvantages of off-line programming? Explain the different robot all layouts.

20 a. Write short notes on any about the following arobo analyser and workspace analyser .

**OR**

b. With neat sketch explain to design the degree of freedom(DOF) to position an end effector at any point in 3-D space?

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SL.NO:1160

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**COMMON TO CIVIL , CSE, BME, MECH , EEE ,ECE , MECT**  
**BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING**  
(Candidates admitted under 2017 Regulations-SCBCS)

Time : 1 1/2 Hours

Maximum Marks:50 Marks

**ELECTRICAL ENGINEERING**

Answer **ALL** questions

**Part-A (5 x 2 =10 Marks)**

- 1 Write the power equation of AC and DC circuit.
- 2 What is Motor?
- 3 What is HVDC system ?
- 4 Define safety in an electrical environment.
- 5 State lenz'slaw.

Answer **ALL** questions

**Part-B (2 x12 =24 Marks)**

- 6 a. Derive the equivalent resistance value when two resistance are connected in series and parallel.

**OR**

- b. Compare series and parallel Circuits.
- 7 a. Briefly explain the construction and principle operation of Dynamometer type MC instrument with necessary diagram and advantage and disadvantages.

**OR**

- b. Explain the effects of electricity on the human body.

Answer **ALL** questions

**PART-C (1 x 16 = 16 )**

- 8 a. (i) How to calculate the Electricity consumption of the electrical appliance and explain it.  
(ii) Why the energy efficient equipments are important? Explain

**OR**

- b. Briefly explain HVDC transmission system with its necessary diagrams.

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**ELECTRONICS ENGINEERING**

(Candidates admitted under 2017 Regulations-SCBCS)

Time : 1 1/2 Hours

Maximum Marks:50 Marks

Answer **ALL** questions**Part-A (5 x 2 =10 Marks)**

- 1 Define MOSFET.
- 2 Restate amplification factor in JFET.
- 3 Restate PROM.
- 4 Define inclination.
- 5 Contrast on HDTV and normal TV

Answer **ALL** questions**Part-B (2 x12 =24 Marks)**

- 6 a. Compare and Contrast MOSFET and JFET characteristics.
- OR**
- b. Describe about variable resistor with relevant diagrams.
- 7 a. Determine the decimal and octal equivalent for the following binary numbers  
i) (10111) and ii) (101101)

**OR**

- b. Describe the working principle of LED TV with relevant diagrams.

Answer **ALL** questions**PART-C (1 x 16 = 16 )**

- 8 a. Demonstrate the reverse bias characteristics of Zener diode with relevant diagrams.
- OR**
- b. Show and explain the functional blocks of satellite communication.

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SL.NO:1140

SUBJECT CODE:17EEEC37

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**ELECTIVE - ELECTRICAL MACHINES AND DRIVES**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Draw the functional blocks of Electric Drive system.
- 2 Elucidate the field control of a DC motor
- 3 Express the equation for torque of a three phase induction motor.
- 4 Identify the importance of feedback diode.
- 5 Differentiate the mode of motoring and braking of Drives
- 6 Define back EMF.
- 7 Why the speed control is not possible in the Synchronous motor?
- 8 Draw the V and Inverted V Curve of a synchronous motor.
- 9 How CLC differ from TRC
- 10 Mention the application of VSI Fed drives

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. What is meant by hunting in a synchronous motor? Explain how it can be minimized with relevant diagrams

**OR**

- b. A 500V series motor having armature and field resistance of 0.2 & 0.3ohm respectively runs at 500rpm when taking 70Amps. Assuming unsaturated field, find out its speed when field diverter of 0.684ohm is used constant torque load

- 12 a. Derive the expression for cooling and also draw the cooling curve.

**OR**

- b. Discuss the working of flux control methods with neat sketch

- 13 a. Draw and explain the general block diagram of electric drive system

**OR**

- b. List out the types of Electric drives explain with example.

- 14 a. Describe the methods of speed control of DC shunt motor

**OR**

- b. Give a detailed notes on working of Two point starter for DC series motor

**(p.t.o)**

2

15 a. Construct the diagram of stepper motor and elucidate the working principle

**OR**

b. Draw and explain the construction and operational details of an induction motor. And express the relation between torque and rotor power factor.

16 a. (i) Explicate the Construction and operational details of double cage rotor induction motor with its merits and demerits.

(ii) Write the short notes on Cogging, Crawling

**OR**

b. Draw and explain the functional block diagram of solid state drives. Mention its application, advantages & disadvantages

17 a. Describe the operation of a single phase fully controlled converter and its output waveform with neat sketch.

**OR**

b. With neat sketch explain the following (i) TRC (ii) CLC.

18 a. Write detailed notes on slip power recovery scheme and list out the methods of power recovery scheme.

**OR**

b. Explain the sub synchronous generation mode of static scherbius drive.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. A 250V shunt motor with an armature resistance of 0.5ohm and a shunt field resistance of 250ohm drives a load the torque remains constant. The motor draws from the supply of armature current of 21A when speed is 600rpm. If the speed is to be raised to 800 rpm mean find the shunt field resistance.

**OR**

b. Classify the types of electrical braking and explain with neat diagram

20 a. Classify the different types of single phase motor and explain with suitable sketch

**OR**

b. Draw and explain the construction and working of cyclo converter fed induction motor control with output wave forms.

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**SL.NO:1140**

SL.NO:1134

SUBJECT CODE:17EECC16

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**POWER ELECTRONICS AND DRIVES**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 List out the turn on methods of thyristor.
- 2 Write the importance of snubber circuit.
- 3 List out the advantages of PWM control.
- 4 List out the various types of inverter.
- 5 Define Heating time constant.
- 6 Define slip power recovery system.
- 7 List out the applications of power semiconductor devices.
- 8 Why the freewheeling diode used in controlled rectifier?
- 9 Why thyristors are not preferred for inverters?
- 10 What are the different ways of receiving variable voltage and variable frequency for a synchronous motor?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Derive the heating time constant for motor –load system.  
**OR**  
b. Construct a step-up chopper and explain.
- 12 a. Elucidate the working of a buck converter with its necessary illustrations.  
**OR**  
b. Explicate the turn-off process of GTO with the help of appropriate voltage and Current waveforms.

**(p.t.o)**

2

- 13 a. (i) How does a GTO differ from a conventional thyristor?  
(ii) Compare IGBT and MOSFET

**OR**

- b. Explain briefly about the computer simulation of Power electronics circuits with a suitable example.
- 14 a. Describe the working of single-phase half wave controlled converter with R load. sketch the necessary waveforms.

**OR**

- b. Briefly explain the working of a single phase half controlled rectifier with R-L Load.
- 15 a. Explain the working of a step-down DC chopper.

**OR**

- b. Explain with neat sketches of various PWM schemes with their merit and demerits.
- 16 a. Develop in detail about multiple PWM technique used for an inverter.

**OR**

- b. Draw the block diagram of an electric drive and explain with its components in detail.
- 17 a. Discuss in detail about various classes of duty based on which drives are classified.

**OR**

- b. Explain the operation of chopper controlled dc separately excited DC motor for motoring and braking with circuit diagrams and waveforms.
- 18 a. Compare DC drives and AC drives with necessary examples and diagrams.

**OR**

- b. Explain in detail the different methods of speed control of DC motor with necessary characteristics.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

- 19 a. Derive an expression for the torque developed by a motor using dynamics of a motor load system.

**OR**

- b. Elucidate the construction and operational details of IGBT with its equivalent circuit and also describe the input and transfer characteristics of an IGBT.

- 20 a. Making use of centre tapped transformer configuration, explain the working of a cycloconverter.

**OR**

- b. Explain in detail about the Kramer system with its suitable illustrations.

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**SL.NO:1134**

SL.NO:1133

SUBJECT CODE:17EESE13

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELE-HIGH VOLTAGE DIRECT CURRENT TRANSMISSION**

Time : Three Hours

Maximum Marks:100 Marks

**Answer ALL questions**  
**Part-A (10 x 2 =20 Marks)**

- 1 State atleast four HVDC projects in India.
- 2 Write the expression for Tip speed ratio
- 3 Draw the block diagram of bipolar link
- 4 Write down any two application DC transmission.
- 5 Define value rating.
- 6 What is the use of transformer tap changer control at the inverter side of an HVDC system?
- 7 What are the effects of trouble caused by harmonics?
- 8 Draw the characteristics of wind power generation.
- 9 Mention the performance criteria for selection of harmonic filter.
- 10 What are the factors depends commutation failure?

**Answer Any FIVE questions**  
**Part-B (5 x10 =50 Marks)**

- 11 a. Comparison between CSC based and VSC based HVDC system.  
**OR**  
b. Explain the complete characteristics of converter as Rectifier and inverter. And also draw the equivalent circuit of HVDC link
- 12 a. Describe the operation of current regulation from the inverter side.  
**OR**  
b. Write short notes on WECS in various countries
- 13 a. Explain about machine side controllers  
**OR**  
b. Explain the complete characteristics of 12 pulse converter.
- 14 a. Explain in detail about the passive and active DC filters with the design criteria.  
**OR**  
b. Explain the detailed analysis of HVDC converter

p.t.o

2

15 a. Write criteria for design of AC filters.

**OR**

b. Explain the parameter and characteristics of three phase fully controlled converter used as inverter.

16 a. Write short notes on problems related with grid connections

**OR**

b. Draw and explain the basic V-I characteristics of HVDC converter control.

17 a. Discuss about variable speed Variable frequency scheme

**OR**

b. Compare the AC and DC transmission and mention the applications of DC transmission.

18 a. Explain detail about the analysis of single and double tuned AC filters and write the design criteria for AC filters.

**OR**

b. Discuss about grid connected WECS

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Describe in details trends in EHV AC and DC transmission.

**OR**

b. Explain in detail about the fundamental requirements of protective relay.

20 a. Explain in detail about the current and voltage differential relay

**OR**

b. Explain in detail about the fundamental Wind farm technology.

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SL.NO:1133

SL.NO:1119

SUBJECT CODE:17PHBS05

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**COMMON TO ALL**  
**SMART MATERIALS**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Demonstrate, how the Metallic glasses can be used for transformer core materials?
- 2 Explain briefly about transformation temperature in SMA.
- 3 Distinguish between Type I and Type II Superconductors.
- 4 Interpret unit cell.
- 5 Demonstrate top-down and bottom-up approach for producing nanoparticles.
- 6 Interpret any two techniques for the synthesis of nanophase materials.
- 7 Explain briefly about top-down approach.
- 8 Describe coercivity and retentivity.
- 9 Explain briefly about soft magnetic materials.
- 10 Identify the reason, why the superconductor exhibits the property of diamagnetism?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Categorize metallic glasses? Give examples. Mention the properties of metallic glasses.  

**OR**

  - b. Draw the unit cells of SC, BCC, FCC and HCP structures
- 12 a. Examine the effects of temperature, magnetic field and current on the superconductivity.  

**OR**

  - b. Schedule the following for SC, BCC, FCC and HCP structures
- 13 a. Explain the properties of diamagnetic materials with neat diagram.  

**OR**

  - b. Explain two characteristics of SMA with neat diagrams.
- 14 a. Explain the properties of Ni-Ti alloy.

p.t.o



**OR**

- b. Express the outline of magnetic and electrical properties of metallic glasses. Mention any two applications of metallic glasses.

- 15 a. Describe the following (i) unit cell (ii) coordination number (iii) nearest neighbour distance (iv) packing factor

**OR**

- b. Explain the advantages, disadvantages and applications of ball milling method.

- 16 a. Explain Carbon Nano Tubes? How are they classified? Explain.

**OR**

- b. Explain in detail about any one of the methods of fabrication of CNT.

- 17 a. Differentiate the properties of dia, para and ferromagnetic materials

**OR**

- b. Discuss the properties of superconductors.

- 18 a. Describe about Type – I super conductor. Write down its characteristics.

**OR**

- b. Discuss Isotope Effect and Meissner effect.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

- 19 a. Categorize hard and soft magnetic materials? Mention their applications.

**OR**

- b. Generalize the properties of metallic glasses.

- 20 a. Illustrate sol-gel method of preparing nanophase materials and mention its advantages.

**OR**

- b. Illustrate hysteresis on the basis of domain theory.

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**VINAYAKA MISSIONS RESEARCH FOUNDATION**

**(Deemed to be University)**

**B.E.DEGREE EXAMINATIONS- FEB - 2022**

**COMMON TO ALL  
PHYSICAL SCIENCES**

(Candidates admitted under 2017 Regulations-SCBCS)

Time : 1 1/2 Hours

Maximum Marks:50 Marks

**PART A - ENGINEERING PHYSICS**

Answer **ALL** questions

**Part-A (5 x 2 =10 Marks)**

- 1 Tell about population inversion.
- 2 Schedule any two applications of laser in industrial field.
- 3 Report about step index fiber.
- 4 Tell about the characteristics of graded index multimode fiber.
- 5 Interpret about X-ray Fluoroscopy.

Answer **Any FIVE** questions

**Part-B (2 x12 =24 Marks)**

- 6 a. Predict the applications of laser in communication, military and chemical fields.  
**OR**
- b. Recognize the following terms: population inversion, pumping process and laser action.
- 7 a. Express the various types of fibers based on refractive index profile.  
**OR**
- b. Express the characteristics of penetrant.

Answer **ALL** questions

**PART-C (1 x 16 = 16)**

- 8 a. Demonstrate the construction and working of semiconductor laser with necessary diagram.  
**OR**
- b. Illustrate the working of X-ray radiography.

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**PART A - ENGINEERING CHEMISTRY**  
(Candidates admitted under 2017 Regulations-SCBCS)

Time : 1 1/2 Hours

Maximum Marks:50 Marks

Answer **ALL** questions  
**Part-A (5 x 2 =10 Marks)**

- 1 Brief the terms electrolytic and electrochemical cell.
- 2 What is helmholtz's electrical double layer?
- 3 Show the structure of EDTA and Ca-EDTA complex.
- 4 Mention the causes of boiler corrosion
- 5 Write a note on solar energy

Answer **Any FIVE** questions  
**Part-B (2 x12 =24 Marks)**

- 6 a. Explain standard electrode potential in detail.  
**OR**  
b. Calculate the emf of the cell  $\text{Mg}/\text{Mg}^{2+} // \text{Cd}^{2+} (\text{aq}) / \text{Cd}(\text{s})$  at  $25^{\circ}\text{C}$  where,  $[\text{Cd}^{2+}] = 0.7\text{M}$ ,  $[\text{Mg}^{2+}] = 1.0\text{M}$  and  $E^{\circ}_{\text{cell}} = 1.97 \text{ V}$ .
- 7 a. Discuss in detail dry corrosion with mechanism.  
**OR**  
b. Describe producer gas in detail.

Answer **ALL** questions  
**PART-C (1 x 16 = 16)**

- 8 a. Explain the working principle of  $\text{H}_2\text{-O}_2$  fuel cell with reactions.  
**OR**  
b. Elaborate the non-conventional energy sources.

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S.No.1118

SL.NO:1092

SUBJECT CODE:17EECC03

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTRO MAGNETIC THEORY**

Time : Three Hours

Maximum Marks:100 Marks

**Answer ALL questions**  
**Part-A (10 x 2 =20 Marks)**

- 1 Modify the Gauss law for magnetic field.
- 2 Write about Gauss law.
- 3 Define electric flux.
- 4 State faraday's law of electromagnetic induction
- 5 Define Phase velocity.
- 6 State Boundary condition of Electrostatic field
- 7 Describe mutual inductance
- 8 How mutual inductance between two coils does relate to their self inductances?
- 9 Define Snell's law
- 10 Point out the basic steps involved to implement the finite element method.

**Answer Any FIVE questions**  
**Part-B (5 x10 =50 Marks)**

- 11 a. Find the expression for energy stored in magnetic field and also derive an expression for magnetic energy density.

**OR**

- b. Obtain an expression for torque in terms of magnetic moment

- 12 a. Obtain the electromagnetic wave equation for free space in terms of electric field.

**OR**

- b. Illustrate with neat sketch about polarization.

- 13 a. The mean diameter of a steel ring is 50 cm and a flux density of  $1 \text{ Wb/m}^2$  is produced by 40 ampere turns per cm. If the cross section of the ring be  $20 \text{ cm}^2$  and the number of turns 500 find (a) the inductance, (b) the exciting current when a gap 1mm long is cut in ring the flux density being  $1 \text{ Wb/m}^2$

**OR**

- b. State and Describe Maxwell equations and explain how to derive from faraday's law.

p.t.o

- 14 a. Derive the general solution of Laplace equation in Three dimensions by separation of variables.

**OR**

- A. Obtain the expression for magnetic flux density at the center of toroidal coil  
 B. A round copper conductor is carrying a current of 250 A. Determine the magnetizing force and flux density at a distance of 10 cm from the conductor
- b.

- 15 a. State and Prove Gauss's Law.

**OR**

- b. Derive an expression for energy stored and energy density in an electrostatic field.

- 16 a. Compare circuit theory and field theory in detail.

**OR**

- b. State and prove Biot - Savart's law.

- 17 a. Illustrate the expression for magnetic field intensity due to infinitely long current carrying conductor.

**OR**

- b. State and explain Faraday's Law

- 18 a. State and Prove pointing theorem in detail.

**OR**

- b. Briefly explain about uniqueness theorem.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

Calculate the capacitance of a parallel plate capacitor with following details.

Plate Area= 100 cm<sup>2</sup>

Dielectric  $\epsilon_1 = 4$ ,  $d_1 = 2$ mm

Dielectric  $\epsilon_2 = 3$ ,  $d_2 = 3$ mm

- 19 a.

If 200 V is applied across the plates what will be the voltage, gradient across each dielectrics.

**OR**

- b. Briefly explain about surface impedance and surface impedance of a flat conductor.

- 20 a. Consider an infinitely long square trough of metal sheet. The sides and bottom of that sheet are at zero potential. The lid separated by a small gaps from the sheet, is at a potential of 80V. Find the potential distribution by using repetitive method.

**OR**

- b. Explain in detail about Laplace's equation in rectangular coordinates based on separation of variables method.

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SL.NO: 1050

SUBJECT CODE:17SASE07

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB-2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTIVE - SOLAR COLLECTORS AND THERMAL ENERGY**  
**CONVERSION**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 Draw a neat diagram of liquid flat plate collectors.
- 2 List the different technologies in solar thermal.
- 3 Define carnot cycle.
- 4 Define collector flow factor.
- 5 Tell about solar powered air conditioner.
- 6 State flat plate solar water heater.
- 7 List the different technologies in solar thermal.
- 8 write the efficiency of a solar power plant.
- 9 Show the main components of a flat plate solar collector.
- 10 What is solar absorption cooling?

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Outline the solar atlas of India.  
**OR**  
b. Outline the heat transfer and pressure drop in a parallel plat duct.
- 12 a. Draw the block diagram of a liquid flat plate collector.  
**OR**  
b. Illustrate about solar central receiver.
- 13 a. Examine the development of liquid flat plate solar collector using concrete as absorber plate and its performance testing.  
**OR**  
b. Determine the performance analysis of conventional air heater.

(p.t.o)

14 a. Demonstrate the features of solar thermal power plants.

**OR**

b. Derive an expression of efficiency of flat plate collectors.

15 a. Summarize the evacuated tube collectors.

**OR**

b. Compare the advantages and disadvantages of vapour absorption refrigeration system and vapour compression refrigeration system.

16 a. Summarize about concentrated solar power using Fresnel lenses.

**OR**

b. Describe the parabolic trough type of solar thermal power plants.

17 a. explain any one type of boiler used in solar thermal power plant.

**OR**

b. Explain in detail about Flat plate air heating collectors

18 a. Discuss any one type of air heating collectors.

**OR**

b. Explain the principles of solar thermal power plants.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Analyze the performance characteristics of solar flat plate collector with different selective surface coatings.

**OR**

b. Demonstrate the basic thermodynamic cycles involved with thermal collector.

20 a. Summarize the optimum tilt angle for a Flat plate solar collector.

**OR**

b. Explain the block diagram of carnot cycle.

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SL.NO: 1042

SUBJECT CODE:17EEEC21

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB-2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**

**ELECTIVE - NON-CONVENTIONAL ENERGY SOURCES**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 What are the conventional sources of energy?
- 2 Mention the advantages and limitations of renewable energy sources.
- 3 Explain the reasons for variation in the amount of solar energy reaching earth surface.
- 4 List out the various types of flat plate collectors.
- 5 Mention the various parameters affecting the performance of a collector
- 6 Define Collector efficiency.
- 7 Demonstrate about Compound Parabolic Concentrators.
- 8 Draw the block diagram of the wind energy system.
- 9 In which system, DFIG is used?
- 10 Explain construction, working principle and characteristics of IG with neat sketches

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Explain briefly about the horizontal wind mills with neat sketches.  
**OR**  
b. Briefly explain about the self excited induction generator with external capacitor.
- 12 a. List out the classifications of geo thermal fields  
**OR**  
b. List out the types of liquid dominated hydro thermal convective systems.

(p.t.o)



13 a. What are the raw materials required for fermentation?

**OR**

b. Write the Percentage compositions of Biogas?

14 a. What is KVIC Bio gas plant?

**OR**

b. List the environmental benefits of bio gas utilization

15 a. Describe the principle of generation of Bio gas and Geo thermal.

**OR**

b. Write the brief history of geo thermal power conversion system?

16 a. Explain briefly about the construction techniques of bio gas plant.

**OR**

b. Explain the economic benefits of Bio gas Utilization.

17 a. Discuss the influence of different renewable energy sources with special reference to the global warming and climate change context.

**OR**

b. What are the components of Tidal Powerplant?

18 a. Highlight types of energy that can be generated from ocean

**OR**

b. Compose direct energy conversion

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Sort out the advantages of MHD generation.

**OR**

b. Explain the Operation of Single basin-One-way cycle

20 a. Explain the Operation of Single basin-Two -way cycle

**OR**

b. Examine the Minimum tidal range required for the working of tidal power plant

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SL.NO: 1041

SUBJECT CODE:17EECC10

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB-2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**POWER SYSTEM OPERATION AND CONTROL**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 What is daily load curve?
- 2 What are the plant level controls?
- 3 Define speed regulation.
- 4 Write a short note on tie-line bias control of two area system.
- 5 Give the characteristics of line compensators.
- 6 Define Static Var Switch.
- 7 What is exact co ordination equation?
- 8 List the merits of priority list method.
- 9 Define network topology.
- 10 Define SCADA.

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. A Generating station has the following daily load cycle:
- | Time (Hours) | 0-6 | 6-10 | 10-12 | 12-16 | 16-20 | 20-24 |
|--------------|-----|------|-------|-------|-------|-------|
| Load (MW)    | 20  | 25   | 30    | 25    | 35    | 20    |
- Draw the load curve ad calculate  
(i) Maximum Demand (ii) Units generated per day (iii) Average load (iv) Load factor

**OR**

- b. What are the components of speed governor system of an alternator? Derive its transfer function with an aid of a block diagram.
- 12 a. Derive the coordination equation for economic dispatch with losses.

**OR**

- b. Develop an iterative algorithm for solving the optimum dispatch equation of an 'n' bus power system taking into account the effects of system losses.

(p.t.o)

- 13 a. Construct the priority list for the given below:

UNIT	Heat rate (MBtu / hr)	Pmin (MW)	Pmax (MW)	Fuel cost (Rs/ MBtu)
1	$510 + 7.20 P_1 + 0.00142 P_1^2$	150	600	1.1
2	$310 + 7.85 P_2 + 0.00194 P_2^2$	100	400	1.0
3	$78 + 7.79 P_3 + 0.00482 P_3^2$	50	200	1.2

$$P_D = 550 \text{ MW}$$

**OR**

- b. For an isolated single area consider the following data:

Area Capacity  $P_r = 1000 \text{ MW}$

Nominal Operating load  $P_{OD} = 500 \text{ MW}$

Inertia constant  $H = 5 \text{ sec}$

Regulation =  $5 \text{ Hz/p.u MW}$

Nominal Frequency =  $50 \text{ Hz}$

Load decreases by 1% for a decrease in frequency by 1%

a) Find the gain and time constant of power system represented with a first order transfer function. If it is an uncontrolled area, then find out the change in frequency due to an increase of load by 75 MW

b) Determine steady state frequency by changing regulation =  $4 \text{ Hz/p.u MW}$ ; nominal operating load  $P_{OD} = 750 \text{ MW}$  and compare with the results of (a)

- 14 a. Explain the load curve and load duration curve.

**OR**

- b. Write short notes on :

i) Load forecasting

ii) Load factor

iii) Diversity factor

- 15 a. Explain about the load frequency control of single area system for steady state or static response.

**OR**

- b. Explain the two area LFC for an uncontrolled case under static analysis.

- 16 a. Explain stability Compensation.

**OR**

- b. Write a short note on excitation system.

- 17 a. Explain priority list method of solving unit commitment problem. State merits and limitations of this method.

**OR**

- b. Discuss the various functions of energy control centre.

18 a. Explain concept of energy control centre.

**OR**

b. Explain need of computer control of power system.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

19 a. Derive the transfer function of an uncontrolled load frequency control of a single area system and derive the expression for static error following a step load change.

**OR**

b. Explain in detail about the Automatic Load Frequency Control Loop.

20 a. Explain the tie-line bias control of two area system.

**OR**

b. With necessary blockdiagram, explain the functions of energy control centre in detail.

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SL.NO:1025

SUBJECT CODE:17EECC13

**VINAYAKA MISSIONS RESEARCH FOUNDATION**  
**(Deemed to be University)**  
**B.E./ B.TECH DEGREE EXAMINATIONS- FEB - 2022**  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
  
**HIGH VOLTAGE ENGINEERING**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions  
**Part-A (10 x 2 =20 Marks)**

- 1 What are the purposes of providing ground wire protection for transmission lines?
- 2 What are the various methods available for generating High DC voltage?
- 3 Define stepped leader in the lightning phenomenon.
- 4 What are the characteristics of an ideal surge diverter?
- 5 List out the uses of liquid dielectrics.
- 6 What is tracking?
- 7 Draw the three phase six pulse voltage multiplier arrangement and express the minimum voltage drop equation
- 8 Draw the circuit diagram of electrostatic voltmeter.
- 9 Describe AC Test Voltage.
- 10 Mention the steps employed for Impulse withstand test on Power Transformer.

Answer **Any FIVE** questions  
**Part-B (5 x10 =50 Marks)**

- 11 a. Derive an expression for ripple in a cascade voltage multiplier circuit.  
**OR**  
b. Explain with suitable diagram for Wilson's and Simpson's theory about charge formation in cloud.
- 12 a. What is impulse current? Explain the operation of impulse generator with diagram.  
**OR**  
b. Draw and describe the construction and principle of operations of multistage impulse generator.
- 13 a. A generating voltmeter has to be designed so that it can have a range from 20 to 200 kV DC. If the indicating meter reads a minimum current of  $2\mu\text{A}$ . What should the capacitance of the generating voltmeter be?  
**OR**  
b. Draw and explain the functions of expulsion gap protective device and discuss its advantages and disadvantages? p.t.o

- 14 a. List out the causes of power frequency over voltages in power system? Explain them in detail.

**OR**

- b. Describe the effects of lightening on the transmission lines?

- 15 a. Describe about corona formation on two conductor line and draw its breakdown characteristics.

**OR**

- b. Explain the mechanism of breakdown in commercial liquids.

- 16 a. Write brief notes on treeing and tracking.

**OR**

- b. Derive Townsend's current growth equation. And explain the criterion for breakdown

- 17 a. Describe the generating voltmeter used for measuring high dc voltages. How does it compare with a potential divider for measuring high dc voltages?

**OR**

- b. What is the necessity of isolator testing? And explain the different methods of testing of an isolator.

- 18 a. Explain the partial discharge test on high voltage cables. How is a fault in the insulation located in this test?

**OR**

- b. Explain, with a schematic diagram of any one method of measuring RIV of transmission line hardware.

**Answer ALL questions**

**PART-C (2 x 15 = 30 )**

- 19 a. Give an expression for ripple and regulation in voltage multiplier circuits. How the ripple and regulation are minimized?

**OR**

- b. Discuss and compare the performance of resistance capacitance and mixed R-C potential dividers for measurement of impulse voltages

- 20 a. What is meant by insulation coordination? How are the protective devices chosen for optimal insulation level in a power system?

**OR**

- b. What is CVT? Explain through phasor diagram how a tuned CVT can be used for HVAC measurement in substations and also explain series capacitor peak voltmeter.

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