Reg. No. : | | | | | | | | | | | | |

EEE

Question Paper Code : 70088

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Second Semester

Electrical and Electronics Engineering

EE 3251 — ELECTRIC CIRCUIT ANALYSIS

(Common to : Electronics and Instrumentation Engineering/Instrumentation and Control Engineering

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the power triangle for inductive load and capacitive load.

2. Give the procedure for nodal analysis of a circuit.

3. State Tellegen's theorem.

4. What is current division rule for resistances in parallel circuit?

5. What is meant by free and forced response?

6. Define damping ratio.

7. State Dot rule' for coupled circuits.

8. List out the characteristics of a parallel resonant circuit.

9. What is a phase sequence of three-phase system?

10. Write down the expression of neutral current in a unbalanced four-wire star connected load.

PART B — (5 × 13 = 65 marks)

11. (a) Determine loop currents in the network shown in Fig. Q.11 (a) using mesh current analysis. Also calculate the power loss in the 10 Ω resistor.

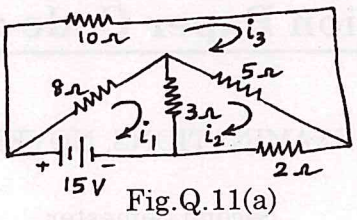

Fig.Q.11(a)

Or

(b) (i) A series RLC circuit has R = 4.2 Ω, L = 0.03 H, c = 450 μF. If the circuit current I = 10 A, find the voltage drop across each element, supply voltage and power factor. Also draw the phasor diagram. Assume the supply frequency is 50 Hz. (8)

(ii) Find the amount of reactive power drawn by the circuit shown in Fig.Q.1 1 (b) (ii). (5)

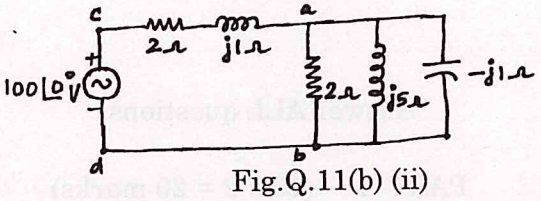

Fig.Q.11(b) (ii)

12. (a) (i) Reduce the given network shown in Fig. Q. 12(a)(i) using star-delta conversion technique and hence calculate the power loss in 1 Ω resistor. (8)

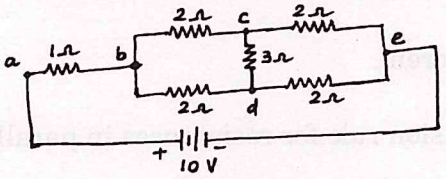

Fig.Q.12(a) (i)

(ii) Find the current in the resistor R_L using the principle of superposition in Fig. Q. 12 (a) (ii). (5)

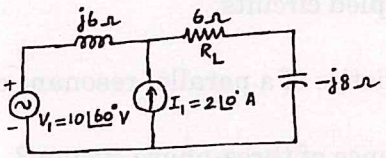

Fig.Q.12(a) (ii)

Or

(b) In the circuit of Fig.Q.12 (b), find the current through load resistor R_L connected across x-y terminals using Thevenin's theorem.

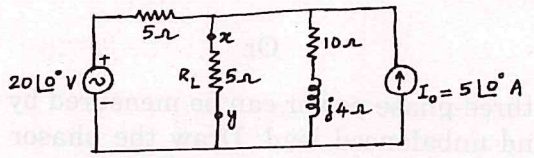

Fig.Q.12 (b)

13. (a) (i) A coil of resistance R and inductance L is in parallel with a capacitance C. Show that the effective resistance under the parallel resonant condition is L/RC. (8)

(ii) Determine the resonant frequency and quality factor of a coil for the series circuit consisting of R = 10 Ω, L = 0.1 H and C = 10 ΩF. (5)

Or

(b) (i) With necessary diagrams, derive the expression for mutual inductance in a single tuned circuit. (8)

(ii) Two coils connected in series have an equivalent inductance of 0.4 H when connected in aiding and 0.2 H if connected in opposing. Calculate the mutual inductance of the coil. (5)

14. (a) In the circuit of Fig. Q.14 (a), the switch is closed on position-1 at t = 0 and after 1 time constant is moved to position-2. Find the transient current response before and after moving position-2. Assume that no initial charge on the capacitor. Also plot the transient current response.

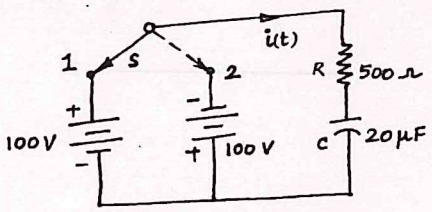

Fig.Q.14(a)

Or

(b) In the circuit shown in Fig. Q. 14 (b), consists of series RC elements R = 100 Ω , C = 25 μF. A sinusoidal voltage v(t) = 200 Sin(500t + ϕ°) volts is applied to the circuit at the time when phase angle ϕ = 0. Determine the transient current response.

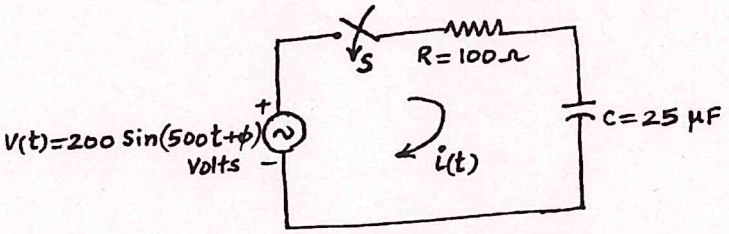

Fig.Q.14(b)

15. (a) With necessary phasor and circuit diagram, deduce the voltage, current, impedance and power relations in the three-phase balanced star connected system.

Or

(b) Show that three-phase power can be measured by two watt meters in the balanced and unbalanced load. Draw the phasor diagrams. Also, derive an expression for power factor in terms of wattmeter readings.

PART C — (1 × 15 = 15 marks)

16. (a) Find the value of load impedance such that maximum power transfer takes place from source to load impedance in the circuit shown in fig. Q. 16(a).

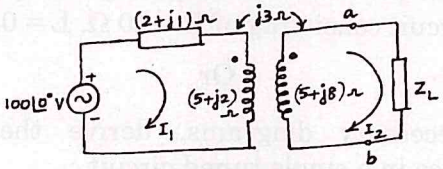

Fig.Q.16(a)

Or

(b) A star connected alternator has 231 V/phase. It supplies a set of lighting loads at phase-R, having phase impedance of 40 ∠ 0° Ω, a capacitive load of 10 ∠–60° Ω at phase-Y and an inductive load of 5 ∠45° Ω at phase-B. The loads are connected in delta. Obtain the phase currents, line currents and line voltages.

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Question Paper Code : 70041

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Second Semester

Electrical and Electronics Engineering

BE 3255 – BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to Electronics and Instrumentation Engineering/ Environmental Engineering/ Instrumentation and Control Engineering)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Say how civil engineering is closely connected to the society.
2. State any four major sub disciplines in mechanical engineering.
3. Name any two leveling instruments used for surveying.
4. What is seasoning of timber?
5. State any two shallow foundations.
6. What is a culvert?
7. What are the major components of an IC Engine?
8. Differentiate between a pump and a turbine.
9. Write the principle of an air conditioner used in our homes.
10. What are psychometric charts?

PART B — (5 × 13 = 65 marks)

11. (a) Write briefly about all the disciplines of civil engineering with reference to their structure and applications.

Or

(b) Explain the growth of automobile engineering from invention to the current market scenario.

12. (a) (i) Discuss the various methods of finding area of given stretch of land (6)

(ii) What are contours and how are they used in different applications. (7)

Or

(b) Discuss about different water proofing materials with respect to their types and applications.

13. (a) Differentiate between stone masonry and brick masonry and explain their types with neat sketches.

Or

(b) (i) Distinguish between state highways and national highways and state how they are managed. (6)

(ii) Classify the railways based on their gauge length and state their relative merits and demerits. (7)

14. (a) Write an essay on hydro electric power plants in India.

Or

(b) With neat diagrams explain the working of two stroke and four stroke engines.

15. (a) Explain in detail all the four stages of vapour compression refrigeration cycle.

Or

(b) Compare room air conditioner and split air conditioner with respect to construction, comfort, working and cost considerations.

PART C — (1 × 15 = 15 marks)

16. (a) As a building engineer, state the importance of plinth area, floor area, built up area and floor space index in a building assigned to you for planning and construction.

Or

(b) Considering the importance of catering to climate change, illustrate the concept of green buildings elaborately.

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Question Paper Code : 70177

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Second Semester

Electrical and Electronics Engineering

PH 3202 – PHYSICS FOR ELECTRICAL ENGINEERING

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is special about electronic polarization?

2. Mention any four properties of pyroelectric materials with an example.

3. Distinguish relaxation time and collision time.

4. Show the magnetic moment alignments of dia, para and ferromagnetic materials.

5. Give an example for direct and indirect bandgap semiconductors and draw its band sketch.

6. What is the working principle of schottky diode?

7. Give the expression for optical absorption coefficient in terms of band gap E_g of a semiconductor.

8. What are (a) Excitons (b) Plasmons?

9. Explain zero, one and two dimentional confinement in nanostructures.

10. What do you understand by 'ballistic transport'?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss the frequency dependence of polarization of dielectric materials. (9)

(ii) Calculate the electronic polarizability of neon. Given radius of neon atom is 0.16 nm and permittivity of free space is 8.85×10^{-12} Fm^{-1}. (7)

Or

(b) (i) Define local field and derive Claussius-Mossoti equation. (9)

(ii) Compare the insulation breakdown in gases, liquids and solids. (7)

12. (a) (i) Based on classical theory, deduce the expression for electrical conductivity. (11)

(ii) Using the Fermi function, evaluate the temperature at which there is 1% probability that an electron in a solid will have an energy 0.5 eV above E_f of 5 eV. (5)

Or

(b) (i) Discuss in detail the origin of band gap when the electron is moving in the periodic potential. (10)

(ii) What are GMR devices? List the applications of these. (6)

13. (a) (i) Differentiate intrinsic and extrinsic semiconductors with examples. (6)

(ii) Deduce an expression for carrier concentration in intrinsic semiconductor. (10)

Or

(b) (i) With neat diagram, explain the experiment to measure the concentration of charge carriers in N type semiconductor using Hall effect. (11)

(ii) The electrical conductivity of Germanium at 20° is 2 mho/m. What is its conductivity at 40°? Bandgap of Germanium = 0.72 eV. (5)

14. (a) (i) Tabulate various optical materials and its applications. (6)

(ii) Discuss the optical absorption in metals, semiconductors and insulators. (10)

Or

(b) (i) Explain the construction, working and advantages of

(1) LED

(2) Laser diode (12)

(ii) Define Kerr and Pockels effect. (4)

15. (a) (i) What are nanomaterials and how are they unique? (6)

(ii) Draw the schematic sketches and corresponding density of states of various low dimensional nanostructures. (10)

Or

(b) (i) What is Coulomb blockade effect? Explain its role in the working of Single electron transistors. (9)

(ii) Give a note on the synthesis techniques and characteristics of metallic nano wires. (7)

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Question Paper Code : 70137

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third Semester

Electrical and Electronics Engineering

MA 3303 – PROBABILITY AND COMPLEX FUNCTIONS

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Statistical Z table should be given.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A pair of dice is tossed twice. Find the probability of scoring 7 points at least once.

2. The probability that a pen manufactured by a company will be defective is $\frac{1}{10}$. If 12 such pens are manufactured, find the probability that exactly two will be defective.

3. If the joint probability density function of the random variable (X,Y) is given by $f(x,y)=kxye^{-(x^2+y^2)}$, $x>0$, $y>0$. Find the value of K.

4. State central limit theorem.

5. Show that the function $f(z)=z\bar{z}$ is nowhere analytic.

6. Under the transformation $W=\frac{1}{Z}$, find the images of $2x+y=2$.

7. Evaluate $\int_c \frac{e^z}{z(1-z)^3}\,dz$ if 0 lies inside c and 1 lies outside c.

8. Expand $f(z)=e^z$ as a Taylor's series about $z=0$.

9. Solve $(D^2-3D+2)y=e^x$.

10. Solve $(xD^2+D)y=0$.

PART B — (5 × 16 = 80 marks)

11. (a) (i) A random variable X has the following probability function: (8)

x :	0	1	2	3	4	5	6	7
p(x) :	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(1) Find the value of k?

(2) Evaluate $P(X < 6)$ and $P(0 < X < 5)$.

(ii) In 256 sets of 12 tosses of a coin in how many cases one can except 8 heads and 4 tails. (8)

Or

(b) (i) In attest on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn for (8)

(1) More than 2150 hours,

(2) Less than 1950 hours.

(ii) Find the moment generating function of the exponential distribution $f(x)=\frac{1}{c}e^{-\frac{x}{c}}, 0 \le x \le 8, c > 0$. Hence find its mean and standard deviation. (8)

12. (a) (i) The joint probability mass function of (X,Y) is given by $f(x,y)=k(2x+3y), x=0,1,2;\ y=1,2,3$. Find all the marginal distribution of X given $Y=2$, $Y=3$. (8)

(ii) Find the covariance for the following heights of fathers X and their sons Y: (8)

X:	65	66	67	67	68	69	70	72
Y:	67	68	65	68	72	72	69	71

Or

(b) (i) A study of prices of rice of Chennai and Madurai gave the following data: (8)

	Chennai	Madurai
Mean	19.5	17.75
S.D.	1.75	2.5

Also the coefficient of correlation between the two is 0.8. Estimate the most likely price at Chennai corresponding to the price of 18 at Madurai.

(ii) If X and Y follow exponential distribution with parameter 1 and are independent, find the probability distribution function of $U = X - Y$. (8)

13. (a) (i) If $f(z)$ is a regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$. (8)

(ii) If $f(z)=u+iv$, is analytic find $f(z)$ and v if $u=\frac{\sin 2x}{\cos 2x+\cos h2y}$. (8)

Or

(b) (i) Find the bilinear map which maps the points $z=1, i, 0$ onto $w=1, i, -1$. (8)

(ii) Show that the map $w=\frac{1}{z}$ maps the totality of circles and lines as circles or lines. (8)

14. (a) (i) Evaluate, using Cauchy's integral formula $\int_c \frac{z+1}{z^2+2z+4}\,dz$, where c is the circle $|z+1+i|=2$. (8)

(ii) Expand $f(z)=\frac{z^2-1}{(z+2)(z+3)}$ in a Laurent's series if $|z|<2$. (8)

Or

(b) (i) Evaluate $\oint_C \frac{z\sec z}{(1-z^2)}dz$, where c is the ellipse $4x^2+9y^2=9$. (8)

(ii) Evaluate $\int_0^{2\pi}\frac{d\theta}{13+5\sin\theta}$. (8)

15. (a) (i) Solve the equation $(D^2-4D+3)y=\sin 3x+x^2$. (8)

(ii) Solve $(x^2D^2-xD+1)y=\left(\frac{\log x}{x}\right)^2$. (8)

Or

(b) (i) Solve the equation $\frac{d^2y}{dx^2}+a^2y=\tan ax$, by the method of variation of parameters. (8)

(ii) Solve the simultaneous equation $\frac{dx}{dt}+2x-3y=t$, $\frac{dy}{dt}-3y+2y=2e^{2t}$. (8)

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Question Paper Code : 70083

B.E./B.Tech DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022

Third Semester

Electrical and Electronics Engineering

EC 3301 – ELECTRON DEVICES AND CIRCUITS

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions

PART A — (10 × 2 = 20 marks)

1. Differentiate Zener breakdown and avalanche breakdown?
2. Mention any two advantages of LED.
3. Defined early effect.
4. The transistor has I_E 10 mA and $\alpha = 0.98$. Find the values of base and collector currents.
5. Compare JFET with BJT.
6. What is an emitter follower?
7. Write the role of Darlington pair.
8. Define a Common Mode Rejection Ratio for a differential amplifer (CMRR). What is the value of CMRR for ideal case?
9. State Barkhausen criterion for sustained oscillations.
10. What will happen to input and output impedance in voltage series feedback configuration?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the operation of PN junction under forward bias with its characteristics. (7)

(ii) Explain how Zener diode can act as a voltage regulator. (6)

Or

(b) What is meant by ripple factor in full wave Rectifier? Draw the Circuit of Full wave rectifier and brief the operation. Find the ripple factor. (13)

12. (a) (i) Explain the drain and transfer characteristics of Enhancement type MOSFET. (6)

(ii) Explain equivalent circuit and V-I characteristics of UJT. (7)

Or

(b) (i) Describe the operating principle of SCR with neat diagram. (6)

(ii) List out the various types of DC biasing for BJT. Also explain the biasing circuit which gives excellent stabilization (7)

13. (a) Using low frequency h-parameter model, derive the expressions for voltage gain, current gain, input resistance and output admittance for a BJT amplifier in CE configuration. (13)

Or

(b) Derive the expression for gain of NMOS source follower along with small signal equivalent circuit. Also explain cascade NMOS amplifier. (13)

14. (a) Draw the circuit diagram and explain the working of a differential amplifier using FET. Derive the expression for different mode gain and common mode gain. (13)

Or

(b) Describe the working of class A and class C power amplifier in details with relevant diagrams. (13)

15. (a) (i) With neat diagram, explain Hartley Oscillator and derive the expression for frequency of oscillation. (7)

(ii) Discuss Colpitts Oscillator and obtain the expression for frequency of oscillation. (6)

Or

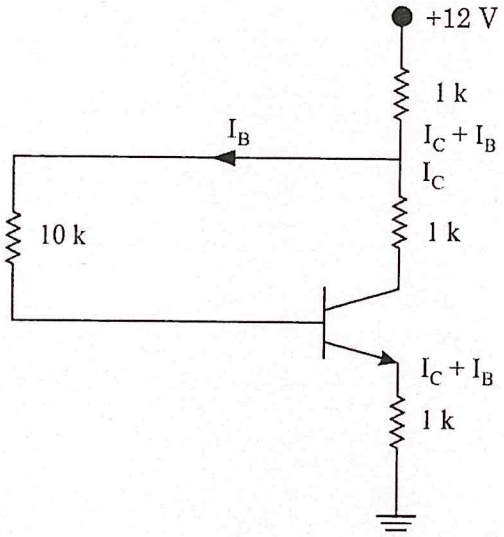
(b) With neat diagram explain the operation of following feedback amplifiers.

(i) Voltage Series Feedback amplifier. (7)

(ii) Current Shunt feedback amplifier. (6)

PART C — (1 × 15 = 15 marks)

16. (a) A transistor having $\alpha = 0.99$ and VBE = 0.7V, is given in the circuit. Find the value of the collector current. (15)



Or

(b) In a centre-tap full wave rectifier the load resistance R_L = 1k Ω. Each diode has a forward bias dynamic resistance to 10 Ω. The voltage across half the secondary winding is 220sin314t. Find

(i) the peak value of current

(ii) the DC or average value of current

(iii) the rms value of current

(iv) the ripple factor and

(v) the rectification efficiency. (15)

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Question Paper Code : 70089

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third Semester

Electrical and Electronics Engineering

EE 3301 – ELECTROMAGNETIC FIELDS

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Given point $P(-2, 6, 3)$ find P in cylindrical and spherical coordinates.

2. Given vectors $A = 3a_x + 4a_y + a_z$ and $B = 2a_y - 5a_z$, find the angle between A and B.

3. State Poisson's equations and Laplace equations.

4. If the electric field intensity is given by $E = (Xu_x + Yu_y + Zu_z)$ volt/m, Find the potential difference between $X(2, 0, 0)$ and $Y(1, 2, 3)$.

5. State the boundary conditions between two magnetic material.

6. Given that the magnetic vector potential $A = (\sin 2\varphi)a_\varphi$ in cylindrical co-ordinates. Find the flux density at $(2, \pi / 4, 0)$.

7. Determine the maximum torque on 80 turn rectangular coil of $0.25\,m \times 0.4\,m$, carrying a current of 10 A in a field of 0.8 Tesla.

8. State Faradays law.

9. State Pointing vector and write its significance.

10. Define intrinsic impedance and estimate its value for free space.

PART B — (5 × 13 = 65 marks)

11. (a) A positive charge of $3\times10^{-3}C$ located at $P_1(3,-2,-4)$m and negative charge of $5\times10^{-6}C$ is located at $P_2(1,-4,3)$m. find (i) vector force on negative charge (ii) Magnitude of force on charge at P_1.

Or

(b) Find the electric field intensity at a point P located at (0,0,h)m due to charge of surface charge density σ C/m^2 uniformly distributed over the circular disc $r \le a, z = 0$ m and correlate your result by applying gauss's law.

12. (a) A total charge of 25nC is distributed around a circular ring of radius 2.5 m with its center located at the origin and lying in xy plane. Find the potential at $(0,0,5)m$.

Or

(b) Four equal point charges, $100\,\mu C$ each are located at the corners of a square of 10 cm side in XY plane. Determine the value of fifth charge, which when placed at Centre of the square. Keep all the four equal charges at their respective equilibrium position. The medium is free space.

13. (a) Two long straight parallel wires in air 2m apart carry currents I_1 and I_2 in the same direction. The magnetic field intensity at midway is 7.5 AT/m. If the force on each wire per unit length is 2.5×10^{-4} N, estimate the currents I_1 and I_2.

Or

(b) State Biot-Savart Law. Deduce the expression for the magnetic field at a point on the axis of a current carrying circular loop of radii is 'R' distant 'X' from the center.

14. (a) Develop Maxwell's equations in Integral and Differential forms time varying fields.

Or

(b) Examine whether the following fields satisfy Maxwell's equations or not. $E = \left[E_m \sin x \, Sin\, t \, a_y\right]$ and $H = \left[(E_m / \mu 0) Cos\, x \cos t \, a_z\right]$.

15. (a) Develop the wave equations from Maxwell's equations for lossy dielectric materials.

Or

(b) Derive the propagation constant for waves in lossless dielectric materials.

PART C — (1 × 15 = 15 marks)

16. (a) Convert the points $P(1,3,5), T(0,-4,3)$ and $S=(-4,-3,-10)$ from Cartesian to cylindrical and spherical coordinate systems. Then transform the vector $\vec{Q}=\frac{\sqrt{x^2+y^2}}{x^2+y^2+z^2}\vec{a}_x-\frac{yz}{x^2+y^2+z^2}\vec{a}_y$ and Evaluate $\vec{Q}$ at T in all the coordinates.

Or

(b) Deduce the expression for the capacitance of parallel plate capacitor having two dielectric media and the capacitor of type specified about as the following details A = 1 t_1 = 0.008, t_2 = 0.003, ε_1= 6 $\varepsilon_0, \varepsilon_2 = \varepsilon_0$. Calculate capacitance at the system. If voltage of 6000 volt is applied across the capacitor determine the potential gradient in two dielectrics.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70091

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third Semester

Electrical and Electronics Engineering

EE 3303 – ELECTRICAL MACHINES - I

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define an electromechanical system. Give example of devices which convert electrical to mechanical and mechanical to electrical energy.

2. Describe multiply excited magnetic field system.

3. List the important conditions for exciting a self-excited DC generator.

4. Draw the internal and external load characteristics of a DC shunt generator.

5. A 220V DC shunt machine has a armature resistance of $0.5\,\Omega$. If the full load armature current is 20, calculate the induced emf when the machine acts (a) generator (b) motor.

6. Write the significance and condition for Hopkinson's test.

7. Define all day efficiency of a transformer.

8. Give the mandatory conditions in paralleling transformers.

9. Write the working principle of a step down auto transformer with a single diagram.

10. State the condition for which a 3 phase - 4 wire distribution transformer will give maximum efficiency (η_{max}) and the range of loading for maximum efficiency.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Compare magnetic and electric circuits. (6)

(ii) Derive the expression for the force and torque on a Current Carrying Conductor. (7)

Or

(b) (i) Calculate the force acting on the plunger of a linear actuator. (7)

(ii) Calculate the current requires to produce a flux of 1.75m. wb in the ring if the relative permeability of the iron is 900, number of turns N = 600 and radius of the cross section r = 3.5 cm. (6)

12. (a) (i) Derive the induced E.M.F. equation of a DC generator. (7)

(ii) Define armature reaction in DC generator and discuss its effects on a two pole generator. (6)

Or

(b) State different commutation techniques of DC generator and illustrate resistance commutation. (13)

13. (a) List the different speed control of DC shunt motor and explain the speed control of at following conditions. (13)

(i) speed below rated speed.

(ii) speed above rated speed.

Or

(b) Explain the laboratory experimental procedure for doing Swinburne's test with a circuit and list the calculations to be made to predetermine the efficiency of DC motor and generator by using Swinburne's test results. (13)

14. (a) (i) Derive the induced EMF equation of transformer. (7)

(ii) A transformer has 600 turns of the primary winding and 20 turns of the secondary winding. Determine.

(1) the secondary voltage if the secondary circuit is open and the primary voltage is140 V.

(2) the primary current if the secondary current is 90 A (6)

Or

(b) (i) A 10 kVA single-phase transformer provides a no-load secondary voltage of 110 volts. If the equivalent secondary winding resistance is 0.015 Ω and its total reactance is 0.04 Ω, determine its voltage regulation when supplying a load at 0.85 power factor lagging. (7)

(ii) Explain the construction and working principle of single phase transformer. (6)

15. (a) A 400 kVA transformer has a primary winding resistance of 0.5 ohm and a secondary winding resistance of 0.001 ohm. The iron loss is 2.5 kW and the primary and secondary voltages are 5kV and 320 V respectively. If the power factor of the load is 0.85, determine the efficiency of the transformer (i) on full load and (ii) on half load. (13)

Or

(b) Sketch and explain an electrical circuit connection of transformer that used to get two- phase power supply from three-phase source and write the application. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Derive the expression for copper saving in a step down auto transformer with a circuit. (15)

Or

(b) (i) A 200 k VA single-phase transformer is in circuit throughout 24 hours. For 8 hours in a day, the load is 150 kW at 0.8 power factor lagging and for 7 hours, the load is 90 kW at 0.9 power factor. Remaining time or the rest period, it is at no-load condition. Full-load Cu loss is 4 kW and the iron loss is 1.8 kW. Calculate the all-day efficiency of the transformer. (8)

(ii) Discuss the real time applications of the following electro mechanical energy conversion devices. (7)

(1) DC Shunt generator

(2) DC series generator

(3) DC Shunt motor

(4) DC Series motor

(5) 3 Phase power transformer

(6) 3 Phase distribution transformer

(7) Auto transformer

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70090

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third Semester

Electrical and Electronics Engineering

EE 3302 – DIGITAL LOGIC CIRCUITS

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Compare TTL and ECL logic families.
2. When is Quine McClusky method preferred for logic minimization?
3. Convert the given expression to the standard SOP form.

   $F(a,b,c) = \sum m(0,1,5,6,10,11,12,13,14,15)$
4. Convert $(1001)_2$ to its equivalent Excess-3 code.
5. Differentiate mealy circuits from moore circuits.
6. Compare synchronous circuits with asynchronous circuits.
7. Distinguish between PAL and PLA
8. What are critical and non critical races?
9. What are generics in VHDL?
10. List out the objects of VHDL.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the working of a 2 input ECL NOR gate.

Or

(b) Explain the operation of 2 input CMOS NAND gate.

12. (a) Implement the sum output of full adder using

(i) 4×1 multiplexer

(ii) 2×1 multiplexer

Or

(b) Design a 3 bit comparator circuit and implement using logic gates.

13. (a) Design a 2 bit even parity generator using moore circuit and implement using D flip flops.

Or

(b) Design a synchronous mod 6 counter using T flip flops.

14. (a) An Asynchronous sequential circuit is described by the following excitation and output function.

$Y = x_1 x_2 + (x_1 + x_2)y$

$z = y$

(i) Draw the logic diagram of the circuit

(ii) Derive the transition table and output map

(iii) Describe the behaviour of the circuit

Or

(b) Give the PLA realization of the given function using a PLA with 3 inputs, 4 AND gates and 2 outputs.

$F_1(a,b,c) = \sum m(0,1,3,4)$

$F_2(a,b,c) = \sum m(1,2,3,4,5)$

15. (a) Write a VHDL code to realize a half adder using

(i) behavioral modeling

(ii) structural modeling

and distinguish between both.

Or

(b) Write a VHDL code to realize a

(i) 4×1 muiltiplexer

(ii) JK flipflop

PART C — (1 × 15 = 15 marks)

16. (a) Design a switching circuit that converts a 4 bit binary code into a 4 bit equivalent gray code and implement using ROM array.

Or

(b) A clocked sequential circuit is provided with a single input x and a single output z. Whenever the input produces a string of pulses 111 or 000, the circuit should produce an output of z=1. (Overlapping is allowed)

(i) Obtain the state diagram

(ii) Obtain the state table

(iii) Design the sequence detector using D flip flop.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70073

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third Semester

Electrical and Electronics Engineering

CS 3353 — C PROGRAMMING AND DATA STRUCTURES

(Common to Electronics and Communication Engineering/Electronics and Instrumentation Engineering/Electronics and Telecommunication Engineering/Instrumentation and Control Engineering)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What will be the output of the following program

```
#include<stdio.h>
int main()
{
    float x = 0.1;
    if(x == 0.1)
        printf("IF");
    else if(x == 0.1f)
        printf("ELSE IF");
    else
    printf("ELSE");
}
```

2. Differentiate between prefix and postfix increment operator.

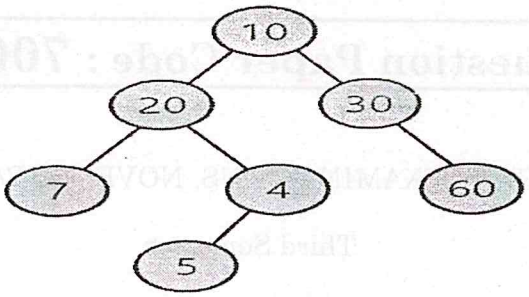
3. Define Enumerated Datatype.

4. State the purpose of Conditional compilation.

5. Specify the rules to be followed with respect to Priority Queues during insertion and deletion process.

6. List few applications of doubly linked list.

7. Write the post-order traversal and In-order Traversal for the below free



8. Define Separate Chaining.

9. What is the worst case runtime of insertion sort and specify the scenario?

10. List the disadvantages of linear search.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Write a program using control structure if....else that examines the value of an integer variable called rating and print one of the following messages,

"Not recommended" - if the value of rating is less than 2

"Recommended' - if the value of rating lies between 2 and 4

"Highly recommended" - if the value of rating is above 4. (5)

(ii) Define Recursive Function in C and Write a program to print the numbers from 1 to 5 using recursive function. (4)

(iii) Predict the output of the following Program and state the reason (4)

```
intmain() {
   inti = 0;
   while(i<= 4) {
      printf("%d", i);
      if(i>3)
        gotoinside_foo;
      i++;  }
   getchar();
   return0;}
voidfoo() {
   inside_foo:
      printf("PP");}
```

Or

(b) (i) Explain how multi-way selection "switch...case" statement implemented in c. (5)

(ii) Define Array and Explain how it can be declared, initialized and accessed by specifying the corresponding syntax. (4)

(iii) Define Loop. Write the syntax of any two loop statements in C. (4)

12. (a) (i) Differentiate between Structure and Union (5)

(ii) Explain the various text file opening modes and their meaning in "C". (4)

(iii) With an example, show how to define a structure, create a structure variables and initialize it. (4)

Or

(b) (i) Write a 'C' Program to find the sum of diagonal elements of the given matrix. (5)

(ii) Define Macro. Write a Macro to find the area of rectangle and use it in a C program. (4)

(iii) Write a 'C' program to find the largest element in an array using Pointers. (4)

13. (a) (i) Define ADT and list the advantages of the same (5)

(ii) Devise an algorithm to perform push and pop operations in a Stack. (4)

(iii) List the advantages and disadvantages of representing a group of items as an array versus a linked list (4)

Or

(b) (i) Write an algorithm to count the number of times a given int occurs in a linked list without Recursion. (5)

(ii) Convert the infix expression $(X - Y / (Z + U) * V)$ into postfix expression (Step-By-Step Trace the values) (4)

(iii) Devise an algorithm to add 2 polynomials using doubly linked list. (4)

14. (a) (i) Define Double Hashing and list the advantages of the same. (5)

(ii) Compare Separate Chaining with Open Addressing. (4)

(iii) State the properties of Binary trees. (4)

Or

(b) (i) Write an algorithm to determine whether a binary tree is complete. (5)

(ii) Give an algorithm to count the number of nodes in a binary tree. (4)

(iii) Devise an algorithm to insert a node in a existing binary search tree. (4)

15. (a) (i) List the steps for sorting the following numbers using merge sort {38, 27, 43, 3, 9, 82, 10) (5)

(ii) Perform heap sort on the following array of elements {9, 7, 5, 11, 12, 2, 14, 3, 10, 6) and produce the step by step procedure. (4)

(iii) Implement Binary Search on the following set of items {12, 18, 23, 25, 29, 32, 35, 40, 58, 66} and key = 18. (4)

Or

(b) (i) Differentiate between linear search and binary search. (5)

(ii) Write an algorithm to perform quick sort for a sequence of elements. (4)

(iii) Explain the working principle of insertion sort with an example. (4)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Given two lists sorted in increasing order, create and return a new list representing the intersection of the two lists. The new list should be made with its own memory — the original lists should not be changed. A dummy node can be used to solve this. (10)

Example:
Input :
First linked list: 1->2->3->4->6
Second linked list be 2->4->6->8,
Output: 2->4->6.
The elements 2, 4, 6 are common in
both the list so they appear in the
intersection list.
Develop a program to solve the above problem

(ii) Find the time complexity of the following code and explain how it is obtained (5)

```
for (i=o; i<n; i++)
{
        for (j=0;j<n;j++)
{
        printf("Value of I = %d "+i);
}
}
```

Or

(b) (i) Develop a C program to read name and marks of n number of students from and store them in a file. If the file previously exits, add the information to the file. (8)

(ii) Design a C program to add two distances in inch-feet system using structure. (7)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90516

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fourth Semester

Electrical and Electronics Engineering

EE 8401 — ELECTRICAL MACHINES-II

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define voltage regulation of an alternator.

2. State the use of slip test on an alternator.

3. Mention the applications of synchronous motor.

4. Compare the synchronous motor with induction motor.

5. What is cogging in induction motor? How can it be overcome?

6. A 4 pole, 3 phase induction motor runs at 1440 rpm on a 50 Hz supply. Find the slip speed and slip.

7. What is voltage/frequency method and write its necessity?

8. Define slip power in an induction motor.

9. Draw the equivalent circuit of a single phase induction motor.

10. Define step angle.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Derive the expression for EMF induced in a three phase alternator. (7)

(ii) A three phase, star connected, 16 pole alternator has 192 slots with 8 conductors/slot, coil span = 160 electrical degrees, speed of alternator = 375 rpm, flux/pole = 55 mwb. Calculate the phase and line voltages. (6)

Or

(b) (i) What is armature reaction in three phase alternator and explain its effects at different power factor on synchronous machine. (7)

(ii) Write the conditions and methods used for connecting two alternators in parallel. With neat diagram, explain any one method in detail. (6)

12. (a) (i) Discuss the principle of operation of a three phase synchronous motor with neat diagrams. (7)

(ii) Derive the expression for power developed in a three phase synchronous motor. (6)

Or

(b) Describe the effect of varying excitation on armature current and power factor with relevant phasor diagrams and write the inference. (13)

13. (a) With neat sketches, explain the construction and principle of operation of a three phase induction motor. (13)

Or

(b) (i) Deduce the power stages in a three phase induction motor. (7)

(ii) The power input to a three phase induction motor is 60 kW, the stator losses are 1 kW. Find the mechanical power developed and rotor copper loss per phase of the motor is running with a slip of 3%. (6)

14. (a) (i) With neat diagrams explain the working of auto transformer starter for a three phase induction motor. (7)

(ii) Describe the rotor resistance starter of a slip ring induction motor with diagram. (6)

Or

(b) With neat sketches, discuss the slip power recovery scheme of three phase induction motor. Enumerate its merits and demerits. (13)

15. (a) Explain the double field revolving theory for operation of single phase induction motor and how the motor is started. (13)

Or

(b) (i) Draw and explain the concept of linear induction motor. (7)

(ii) Explain the principle of operation of AC series motor with neat sketch. (6)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Derive the expression for the torque developed in a three phase induction motor and deduce the condition for maximum starting torque. (8)

(ii) Discuss the complete torque – speed characteristics of three phase induction motor and explain the four quadrant operation of the motor. (7)

Or

(b) (i) Draw and explain the approximate equivalent circuit of a three phase induction motor. (8)

(ii) A 3 phase, star connected 450 V, 50 Hz, 4 pole induction motor has the following per phase parameters in ohms, referred to the stator.

$R_1 = 0.15\,\Omega, X_1 = 0.45\,\Omega, R'_2 = 0.12\,\Omega, X'_2 = 0.45\,\Omega, X_m = 28.5\,\Omega$ Compute the stator current and power factor when the motor is operated at rated voltage and frequency with S = 0.04. (7)

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15. (a) Explain the double field revolving theory for operation of single phase induction motor and how the motor is started. (18)

Or

(b) (i) Draw and explain the concept of linear induction motor. (7)

(ii) Explain the principle of operation of AC series motor with neat sketch. (6)

PART C – (1 × 16 = 16 marks)

16. (a) (i) Derive the expression for the torque developed in a three phase induction motor and deduce the condition for maximum starting torque. (8)

(ii) Discuss the complete torque – speed characteristics of three phase induction motor and explain the four quadrant operation of the motor. (7)

Or

(b) (i) Draw and explain the approximate equivalent circuit of a three phase induction motor. (8)

(ii) A 3 phase, star connected 450 V, 50 Hz, 4 pole induction motor has the following per phase parameters in ohms, referred to the stator.

$R_1 = 0.15\Omega$, $X_1 = 0.45\Omega$, $R_2 = 0.12\Omega$, $X_2 = 0.45\Omega$, $X_m = 28.5\Omega$. Compute the stator current and power factor when the motor is operated at rated voltage and frequency with $S = 0.04$. (7)

Reg. No. : | | | | | | | | | | | |

Question Paper Code : 90518

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fourth Semester

Electrical and Electronics Engineering

EE 8403 — MEASUREMENTS AND INSTRUMENTATION

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the functional elements of a measuring instrument.
2. Illustrate the difference between accuracy and precision.
3. List the possible causes of errors in moving iron instruments.
4. Give the importance of iron loss measurement.
5. Draw the circuit diagram write the expression for unknown inductance and its resistance of Anderson's bridge.
6. State the condition for balance in a wheatstone bridge.
7. Distinguish between LED and LCD.
8. Mention the different methods of magnetic tape recording.
9. Quote the principle of operation of optical transducer.
10. Classify any two applications of Smart Sensors.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the functional elements of an instrument with a neat block diagram (7)

(ii) Describe the static and dynamic characteristics of measuring instruments. (6)

Or

(b) (i) Discuss the different types of standards and errors of Measurements. (7)

(ii) Discuss the significance of calibration. (6)

12. (a) Discuss with circuit and phasor diagram, describe the working of single phase AC Energy meter.

Or

(b) Describe the construction and working of permanent magnet moving coil instrument. Also derive the expression for deflection.

13. (a) Quote the procedure of measuring a low resistance with help of Kelvin's double bridge. Derive the relation to find unknown resistance.

Or

(b) Describe in detail about:

(i) Interference and screening

(ii) Multiple earth and earth loops

14. (a) With the help of the fundamental block diagram, explain the working principle of digital storage oscilloscope, mention its advantages over analog CRO?

Or

(b) Explain the Dot matrix printer working and sketch the construction layout.

15. (a) (i) Describe the various factors influencing the type of transducer for a particular application. (7)

(ii) Examine how to measure pressure using capacitive type transducer. (6)

Or

(b) (i) Explain in brief about data acquisition system? With generalized block diagram, explain the functions of it. (7)

(ii) Describe about smart sensor. (6)

PART C — (1 × 15 = 15 marks)

16. (a) Evaluate the expression for the current through the galvanometer in case of unbalanced Wheatstone Bridge and also state its application.

Or

(b) Explain how the inductance is measured in terms of known Capacitance using Maxwell's bridge. Compose the conditions for balance.

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Reg. No. : | | | | | | | | | | | |

Question Paper Code : 90517

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fourth Semester

Electrical and Electronics Engineering

EE 8402 — TRANSMISSION AND DISTRIBUTION

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. "The Proximity effect is high in underground cables than overhead transmission Line"– Justify the given statement.

2. Find the value of capacitance of a 3ϕ overhead line when the radius of the conductor is 0.5cm and the spacing between the conductors is 300cm.

3. Brief on the transmission line loadability limit with a neat loadability Curve.

4. A three phase 132kv, 20MW long transmission line has its parameters given as $\sqrt{YZ} = 0.07495 + j0.2562$ and $\sqrt{\frac{Z}{Y}} = 444.83\angle -16.3°$.

   Calculate the line value of sending end voltage of the transmission line.

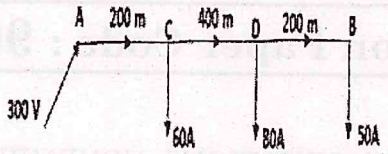
5. Validate the statement- "Suspension type insulator are used for the transmission of electrical power for voltages above 33 kV".

6. Brief on aeoline vibration and its cause on over head transmission line conductors.

7. Give reason for the following statement- "Intermediate sheaths type of grading is provided to improves voltage distribution of the dielectric of the cable".

8. Mention the different classification of cables based on the voltage rating.

9. Find the voltage drop in the section CD of the given 2 wire DC distributor 800m long fed at one end as shown in the figure below. The resistance of one conductor is 0.4 /Km.

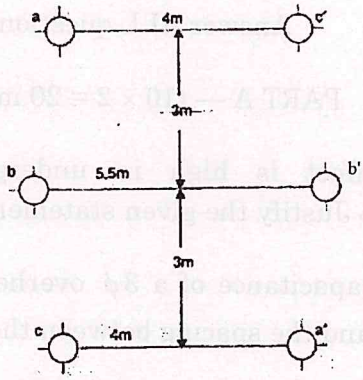


10. List out the limitations of Kelvin's law for finding economic size of the conductor.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Derive the inductance of unsymmetrically placed three phase conductor when transposed. (5)

(ii) Also, find the inductance per phase per km of a double circuit three phase line shown below. The transposed conductor are of radius 0.75cm each. (8)



Or

(b) (i) Derive the expression for capacitance of a double circuit line for hexagonal spacing. (10)

(ii) Why the concept of self GMD is not applicable for capacitance calculation? (3)

12. (a) (i) A balance 3 phase transmission load of 30MW is supplied at 132 kV and 0.85 pf lagging using 80km length transmission line. The impedance of a single conductor is (20+j52) ohms and the total phase-neutral admittance is $315*10^{-6}$ Siemen. Using nominal T method determine A, B, C and D constants of the line, sending end voltage and regulation of the line. (10)

(ii) List out the limitations of nominal T method. (3)

Or

(b) (i) Brief on end condenser method for short transmission line equivalent circuit. (5)

(ii) A single phase transmission line has total resistance, inductive reactance and susceptance as 25 ohms, 80 ohms and $14*10^{-14}$S. The receiving end voltage is 66000V when delivering a load of 15000 kW at 0.8pf. Calculate the percentage regulation and supply power factor using end condenser method. (8)

13. (a) Each line of the three insulators forming a string has a self- capacitance of C Farad. The shunt capacitance of each insulator is 0.2 C to earth and 0.1 C to line. A guard ring increases the capacitance of line of the metal work of the lowest insulator to 0.3 C. Calculate the string efficiency by considering and not considering guard rings.

Or

(b) (i) A transmission line has a span of 275m between level supports. The conductor has an effective of 1.96 cm and weights 0.865 kg/m. Its ultimate strength is 8060 kg. If the conductor has ice coating of radial thickness 1.27 cm and is subjected to a wind pressure of 3.9 gm/cm^2 of projected area, calculate sag for a safety factor 2. Weight of 1 C.C of ice is 0.91 gm. (5)

(ii) The towers of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kg, find the minimum clearance of the conductor and water. Also calculate clearance mid-way between the supports. Weigh of conductor is 1.5 kg/m. Consider the base of the tower at water level. (8)

14. (a) (i) Write a note on Capacitive grading. (5)

(ii) A single core cable of conductor diameter 1.8 cm and lead sheath of diameter 5.4cm is to be used on a 66kV, 3 phase system. Two intersheaths of diameter 3 cm and 4.2 cm are used in between to obtain uniform distribution of stress. Find the voltage at which the two intersheaths are maintained if the maximum stress in the layer is same. (8)

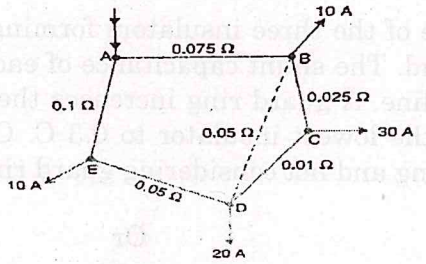
Or

(b) (i) Brief on the construction of single core cable. (5)

(ii) A single core lead sheath cable has a conductor diameter of 3cm; the diameter of the cable being 9 cm. The cable is graded by using two dielectrics of relative permittivity 5 and 4 respectively with corresponding safe working of 30kV/cm and 20 kV/cm. Calculate the safe working voltage of the cable. (8)

15. (a) (i) Graphically illustrate the calculation of economic sizing of conductor in a transmission line. (5)

(ii) A ring main distribution system is fed at A, with an interconnector connected between the point BD. The resistance of various sections are as indicated in the figure. Calculate the Thevenin's open circuit voltage and the current through the interconnector. (8)



Or

(b) Write short note on the following:

(i) Single bus bar (3)

(ii) Double breaker bus bar system (5)

(iii) Ring bus bar system. (5)

PART C — (1 × 15 = 15 marks)

16. (a) For the shown Fig. Q. 16 (a) stranded conductor calculate the self GMD. Consider the radius of each strand to be "r". Also give inference on GMR and GMD calculation.

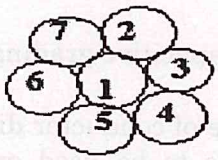


Fig. Q. 16 (a)

Or

(b) An electric train runs between two substation 6 km apart maintained at voltage 600 V and 590 V, respectively and draws a constant current of 300 A while in motion. The track resistance of go and return path is 0.04 Ω/km. Find the point along the track where minimum potential occurs, the current supplied by the substation A where the train is at the point of minimum potential and the current supplied by the substation B where the train is at the point of minimum potential.

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90519

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fourth Semester

Electrical and Electronics Engineering

EE8451 — LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

(Common to: Electronics and Instrumentation Engineering/ Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of IC over discrete component circuits?
2. Why the epitaxial layer is called so?
3. What is a scale changer?
4. Define Input Offset voltage.
5. Draw the transfer characteristics of practical comparator.
6. Mention the conditions to be satisfied for sustained oscillations in sine wave generators.
7. What is the function of VCO in PLL?
8. Why the 555 timer is called so?
9. Mention the standard positive voltage regulator ICs.
10. List the applications of SMPS.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the silicon wafer preparation process with neat sketch.

Or

(b) Explain the different types of IC resistor fabrication technique.

12. (a) With neat sketch explain the 3 input inverting summing amplifier.

Or

(b) Describe the working of differentiator and Integrator and also draw the output when the input is square wave.

13. (a) Explain the working of a negative clipper and draw the output voltage waveform for positive and negative V_{ref} Values.

Or

(b) Explain the flash type and Successive Approximation type ADC with neat sketch.

14. (a) Briefly discuss the types of phase detectors a present in the Phase Locked Loops(PLL).

Or

(b) With neat sketch describe the working of a Monostable multivibrator using 55 timer.

15. (a) Discuss the operation of Instrumentation amplifier with neat sketch.

Or

(b) Explain the operation of SMPS.

PART C — (1 × 15 = 15 marks)

16. (a) Design a circuit Op-amp, which implements the following equations:

(i) Vo=sine wave when input is cosine wave.

(ii) $Vo=3(V_1+V_2)$

(iii) $Vo=(V_1 \times V_2)/V_3$

(iv) $Vo=5V_1-5V_2$

Or

(b) Briefly Explain the V–I and I–V converter circuit using operational Amplifire.

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90751

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fourth Semester

IC 8451 – CONTROL SYSTEMS

(Common to: Electrical and Electronics Engineering/Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define control system.

2. Draw the block diagram of closed loop control system.

3. List the parts of time response of a control system.

4. Draw the block diagram of a second order control system.

5. Write an equation for maximum overshoot.

6. For a second order system where does the resonant peak occur?

7. List the difficulties faced while applying Routh-Hurwitz criterion.

8. How does Nyquist criterion differ from Routh-Hurwitz criterion?

9. Define state variable.

10. Distinguish between state vector and state space.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the poles and zeros of the transfer function.

Or

(b) Explain how you represent a continuous system by signal flow graph. List the rules for drawing signal flow graph. (9+4)

12. (a) Explain the specified input test signals applied for time response analysis of a control system.

Or

(b) Explain the time response of a first order continuous system subjected to unit step function.

13. (a) Explain the initial slope of Bode plot.

Or

(b) How do you determine gain margin and phase margin from Bode plot?

14. (a) How do you obtain closed loop frequency response of a unity feedback control system from Nyquist plot?

Or

(b) Explain the application of Nyquist criterion to determine stability of a closed loop control system.

15. (a) Explain the infinite series method to solve homogeneous state equation.

Or

(b) Explain the state space representation of n^{th} order differential equation.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the important rules for block diagram reduction.

Or

(b) With suitable schematic derive the transfer function of thermal water heating system.

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Reg. No. : | | | | | | | | | | | |

Question Paper Code : 90523

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fifth Semester

Electrical and Electronics Engineering

EE 8552 – POWER ELECTRONICS

Common to: Mechatronics Engineering

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is secondary breakdown in power BJT?

2. Differentiate Latching current from holding current.

3. Provide a table relating pulse numbers, phase-controlled rectifier type and ripple frequency.

4. What is IGR in the dual converter?

5. What is a time ratio control?

6. What are resonant converters?

7. What are integral body diodes?

8. What is THD?

9. A 3-phase full converter delivers a ripple free load current of 10 A with a firing angle delay of 45°. The input voltage is 3-phase, 400 V,50 Hz. The source current is given by the following relation.

$$i(t) = \sum_{n=1,3,5}^{\infty} \frac{4Io}{n\pi} \sin\frac{n\pi}{3} \sin(n\omega t - n\alpha)$$

Find the fundamental component of the source current amplitude.

10. What is integral cycle control?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the working principle of IGBT with relevant circuit diagrams and characteristics. State merits and limitations of the same.

Or

(b) Explain the two-transistor analogy of SCR and derive the anode current equation.

12. (a) Describe the working of $3-\Phi$ fully controlled bridge converter in the Rectifying mode and in inversion mode. And derive the expressions for average output voltage and rms output voltage.

Or

(b) Obtain the effect of source inductance in single-phase fully controlled rectifier and extend the discussion to three-phase converter.

13. (a) Explain the waveforms of type A chopper. Derive the expression for current ripple when it feeds RL load.

Or

(b) Describe the working of four quadrant chopper.

14. (a) With neat sketches, explain the operation of three phase voltage source inverter. Draw phase and line voltage waveforms on the assumption that each thyristor conducts for 180° and the resistive load is star connected.

Or

(b) Enumerate the working of the auto sequential commutated inverter with relevant diagrams.

15. (a) For a single-phase voltage controller feeding a resistive load, show that power factor is given by the expression.

$$\left[\frac{1}{\pi}\left\{(\pi-\alpha)+\frac{1}{2}\sin 2\alpha\right\}\right]^{1/2}$$

Or

(b) Discuss the operation of a single-phase to single phase cycloconverter for the output frequency one third of the input frequency.

PART C — (1 × 15 = 15 marks)

16. (a) (i) A single phase semi-converter is operated from 230V, 50Hz supply. The load current with an average value of I_a is continuous with negligible ripple content. The turns ratio of the transformer is unity. If the delay angle is $\alpha = \pi/3$, calculate (1) the harmonic factor of input current, (2) displacement factor and (3) the input power factor. (10)

(ii) For the single phase fully controlled bridge is connected to RLE load. The source voltage is 230 V, 50 Hz. The average load current of 10A continuous over the working range. For $R = 0.4\Omega$ and $L = 2mH$, Compute (5)

(1) Firing angle for E=120V

(2) Firing angle for E= –120V

Or

(b) A single-phase voltage controller is employed for controlling the power flow from 230V, 50Hz source into a load circuit consisting of $R = 3\Omega$ *and* $\omega L = 4\Omega$. Calculate

(i) The control range of firing angle, (3)

(ii) The maximum power and power factor (3)

(iii) The maximum value of rms load current (3)

(iv) The maximum possible value of di/dt that may occur in the thyristor, and (3)

(v) The conduction angle for $\alpha = 0°$ and $\alpha = 120°$ assuming a gate pulse of duration π radians. (3)

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90522

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fifth Semester

Electrical and Electronics Engineering

EE 8551 – MICROPROCESSORS AND MICROCONTROLLERS

(Common to: Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the flags in 8085 microprocessor.
2. How many machine cycles are needed to execute STA 1800?
3. Write the operation carried out when PCHL instruction is executed in 8085.
4. Which are the instructions used for subroutine handling in 8085?
5. How do you select the register bank in 8051 microcontroller?
6. Write the RAM and ROM capacity in 8051 microcontroller.
7. Mention the applications that use ADC and DAC.
8. List the various modes of 8254 Timer.
9. Write the operation carried out when MOVXA, @R1 instruction is executed.
10. List out the commands used in LCD.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the interrupt structure of 8085 microprocessor. (13)

Or

(b) Explain the addressing modes of 8085 microprocessor with one example for each. (13)

12. (a) Write 8085 assembly language program to arrange the given array having ten *byte* type data in ascending order. (13)

Or

(b) Write an assembly language program for 8085 microprocessor to convert binary number 'C9H' to BCD number and store the result in internal RAM. (13)

13. (a) With the help of neat diagram explain the architecture of 8051 microcontroller in detail. (13)

Or

(b) Write about the Mode-1 and Mode-2 timer operations with the control registers used in 8051. (13)

14. (a) Draw and explain the block diagram of 8255 in detail. Explain control word definition of the same. (9+4)

Or

(b) With neat block diagram, explain the description and function of 8279. (13)

15. (a) Write in detail about the interfacing of keyboard with 8051 microcontroller. (13)

Or

(b) Discuss on control of servo motor by 8051 microcontroller. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Write the assembly language program for the 8051 Microcontroller to run the stepper motor having step angle of 1.8° for 180° rotation in anti-clockwise direction. Draw the necessary diagrams. (15)

Or

(b) Draw the interfacing diagram and write 8051 assembly program to display the message *INDIA* in a 20 × 2 LCD. (15)

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Question Paper Code : 90521

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fifth Semester

Electrical and Electronics Engineering

EE 8501 – POWER SYSTEM ANALYSIS

(Regulations 2017)

Time : Three hours Maximum : 100 marks

(Codes/Tables/Charts to be permitted, if any, may be indicated)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the bus admittance matrix?

2. What are the data required for a load flow study?

3. What is the need for slack bus in power flow analysis?

4. Define voltage-controlled bus.

5. What are the assumptions made in short circuit studies of large power system network?

6. Define fault level.

7. Write boundary conditions for single line to ground faults.

8. Define short circuit capacity.

9. Define steady state stability limit.

10. What is power system stability?

PART B — (5 × 13 = 65 marks)

11. (a) Draw the PU impedance diagram for the system shown in Fig. 11(a). Choose Base MVA as 100 MVA and Base KV as 20KV.

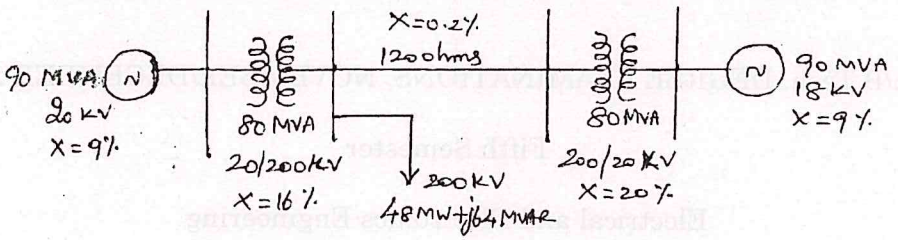

Fig. 11 (a)

Or

(b) The single line diagram of a simple power system is shown in Fig 11(b). The rating of the generators and transformers are given below:

Generator 1: 25MVA, 6.6KV, X = 0.2p.u

Generator 2: 5MVA, 6.6KV, X = 0.15p.u

Generator 3: 30MVA, 13.2KV, X = 0.15p.u

Transformer 1: 30MVA, 6.9 Δ /115Y KV, X = 10%

Transformer 2: 15MVA, 6.9 Δ /115Y KV, X = 10%

Transformer 3: Single phase units each rated 10MVA, 6.9/69KV, X = 10%

Examine the impedance diagram and mark all values in p.u choosing a base of 30MVA, 6.6KV in the generator 1 circuit.

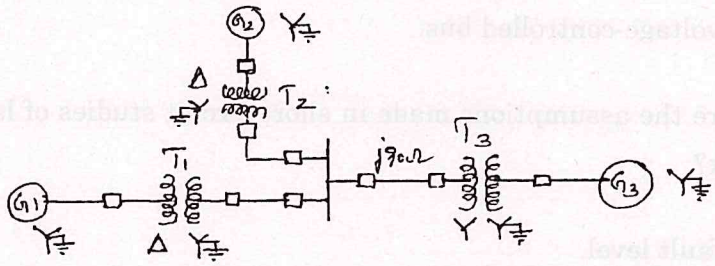

Fig. 11 (b)

12. (a) Derive N-R method of load flow algorithm and explain the implementation of this algorithm with the flowchart.

Or

(b) The Fig. 12 (b) shows the one line diagram of a simple 3 bus system with generation at buses 1 and 3. Line impedance are marked in p.u on a 100 MVA base. Determine the bus voltages at the end of second iteration using Gauss seidal method.

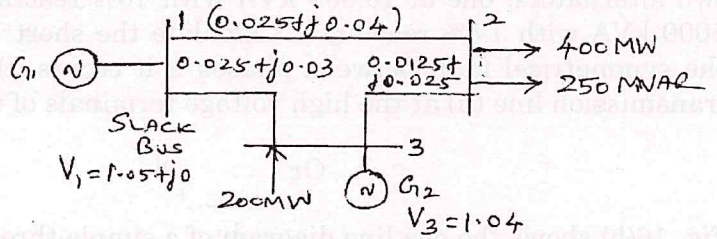

Fig. 12 (b)

13. (a) A 3-phase 6MVA, 6.6 KV alternator with a reactance of 12% is connected to a feeder of series impedance (0.10 + j0.5) ohm/phase/Km through a step up transformer. The transformer is rated at 3 MVA, 6.6 KV/33KV and has a reactance of 7%. Determine the fault current supplied by the generator operating under no load with a voltage of 6.9 KV when a three phase symmetrical fault occurs at a point 16 Km along the feeder.

Or

(b) Explain the step by step procedure for systematic fault analysis for a three phase fault using bus impedance matrix.

14. (a) Examine the sequence network for a double line to ground (LLG) fault.

Or

(b) A 30MVA 11KV 3phase synchronous generator has a direct sub transient reactance of 0.25pu. the negative and zero sequence reactance are 0.35 and 0.1 pu respectively. The neutral of the generator is solidly grounded. Find the sub transient currents and the line to line voltages at the fault under sub transient conditions when a line to line fault occurs at the terminals of the generator. Assume that the generator is unloaded and operating at rated terminal voltage when the fault occurs.

15. (a) A generator rated 75 MVA is delivering 0.8 pu power to a motor through a transmission line of reactance j 0.2 p.u. The terminal voltage of the generator is 1.0 p.u and that of the motor is also 1.0 p.u. Determine the generator e.m.f behind transient reactance. Find also the maximum power that can be transferred.

Or

(b) Explain the modified Euler method of analyzing multi machine power system for stability, with neat flow chart.

PART C — (1 × 15 = 15 marks)

16. (a) A 3-phase transmission line operating at 33 kV and having a resistance of 5Ω and reactance of 20Ω is connected to the generating station through 15,000 kVA step-up transformer. Connected to the bus-bar are two alternators, one of 10.000 kVA with 10% reactance and another of 5000 kVA with 7.5% reactance. Calculate the short - circuit kVA fed to the symmetrical fault between phases if it occurs (i) at the load end of transmission line (ii) at the high voltage terminals of the transformer.

Or

(b) Fig. 16(b) shows the one line diagram of a simple three bus power system with generation at buses at 1 and 2. the voltage at bus 1 is V = 1+j0.0 V per unit. Voltage magnitude at bus 2 is fixed at 1.05 p.u. with a real power generation of 400 MW. A Load consisting of 500MW and 400 MVAR base. For the purpose of hand calculation, line resistance and line charging susceptances are neglected.

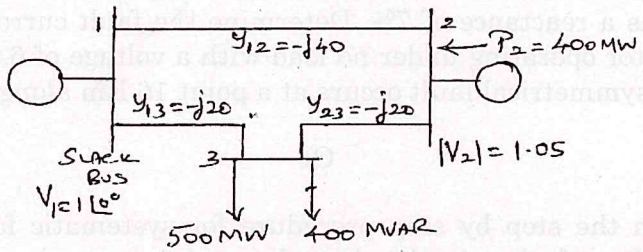

Fig. 16 (b)

Using Newton-Raphson method, start with the initial estimates of $V20 = 1.05 + j0.0$ and $V30 = 1.05 + j0.0$, and keeping $|V_2| = 1.05$ p.u., examine the phasor values V_2 and V_3. Perform two iterations.

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90524

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fifth/Eighth Semester

Electrical and Electronics Engineering

EE 8591 — DIGITAL SIGNAL PROCESSING

(Common to : Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define energy and power signals.
2. State sampling theorem.
3. What is the region of convergence of z transform?
4. Write the equation of Discrete Time Fourier Transform pair.
5. What is zero padding? What are its uses?
6. How many multiplications and additions are required to compute N-point DFT using radix-2 FFT?
7. Give the equation of the Hamming window.
8. What is prewarping?
9. Mention the important features of Harvard architecture.
10. List any four commercial digital signal processors.

PART B — (5 × 13 = 65 marks)

11. (a) Determine whether or not the system $y(n)=x(-n+2)$ is

    (i) Linear
    (ii) Causal
    (iii) Stable
    (iv) Time invariant
    (v) Static. (13)

Or

(b) Describe the sampling and quantization process with an example, and explain aliasing effect. (5+5+3)

12. (a) (i) Find the z-transform with ROC of the signal $x(n)=\left[3(3)^n-4(2)^n\right]u(n)$. (6)

(ii) Determine the inverse z transform of the following expression using partial fraction expansion. (7)

$$X(z)=\frac{1}{\left(1-\frac{1}{3}z^{-1}\right)\left(1-\frac{1}{6}z^{-1}\right)}\ ROC|z|>\frac{1}{3}$$

Or

(b) (i) A linear time-invariant system is characterized by the system function (8)

$$H(z)=\frac{3-4z^{-1}}{1-3.5z^{-1}+1.5z^{-2}}.$$

Specify the ROC of $H(z)$ and determine $h(n)$ for the following conditions:

(1) The system is stable

(2) The system is causal

(3) The system is anticausal

(ii) Find the linear convolution of

$x(n)=\{1,2,3,4,2,1,7\}$ with $h(n)=\{2,3,-1,6\}$. (5)

13. (a) List and explain the properties of Discrete Fourier Transform with equations. (13)

Or

(b) (i) Elaborate the steps of radix-2 Decimation in Time (DIT) FFT algorithm. (8)

(ii) Find circular convolution of the sequences using concentric circle method $x(n)=\{1,1,2,-1\}$ and $h(n)=\{1,2,3,4\}$. (5)

14. (a) Determine the coefficients of a linear-phase FIR filter of length M = 15 which has a symmetric unit sample response and a frequency response that satisfies the conditions (13)

$$H_r\left(\frac{2\pi k}{15}\right)=\begin{cases}1, & k=0,1,2,3\\ 0.4, & k=4\\ 0, & k=5,6,7\end{cases}$$

Or

(b) Determine the digital transfer function obtained by transforming the following analog transfer function using the impulse invariance method. Assume T = 1 sec. $H_a(S)=\frac{2}{(s+1)(s+4)}$. (13)

15. (a) (i) Explain the functions of the MAC unit. (4)

(ii) Elaborate the principle of pipelining with an example. (9)

Or

(b) Discuss various types of addressing modes of digital signal processors with suitable examples. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Compute 8 point DFT of the sequence $x(n)=\{1,2,3,\ 2,1,\ 2,3,\ 2\}$ using the Decimation in Time (DIT) algorithm.

Or

(b) Compute IDFT of the sequence $X(k)=\{8,1+2j,1-j,0,1,0,1+j,1-2j\}$ using the Decimation in Frequency (DIF) algorithm.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91021

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fifth/Seventh Semester

OCE 551 – AIR POLLUTION AND CONTROL ENGINEERING

(Common to: Aeronautical Engineering/Aerospace Engineering/Agriculture Engineering/Automobile Engineering/Biomedical Engineering/Computer Science and Engineering/Computer and Communication Engineering/Electrical and Electronics Engineering/Electronics and Communication Engineering/Electronics and Instrumentation Engineering/Electronics and Telecommunication Engineering/Environmental Engineering/Geoinformatics Engineering/Industrial Engineering/ Industrial Engineering and Management/Instrumentation and Control Engineering/Manufacturing Engineering/Marine Engineering/Material Science and Engineering/Mechanical Engineering/ Mechanical Engineering (Sandwich)/Mechanical and Automation Engineering/ Mechatronics Engineering/ Medical Electronics/Petrochemical Engineering/Production Engineering/Robotics and Automation/Artificial Intelligence and Data Science/Bio Technology/Chemical Engineering/Chemical and Electrochemical Engineering/Fashion Technology/Food Technology/Handloom and Textile Technology/Information Technology/Petrochemical Technology/Petroleum Engineering/Pharmaceutical Technology/Textile Chemistry/Textile Technology)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the effects of photochemical smog.

2. List out the sources of Air pollution emissions.

3. Define lapse rate.

4. Define box model dispersion.

5. State the principle of cyclone filter.

6. List the control equipment used to remove fine particulate matter.

7. Mention the environmental legislation for air pollution control.

8. Define Pollution Standard Index (PSI).

9. State the noise standards.

10. Write a short note on Indoor Air Pollution.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss in detail the effects of air pollution on human being and vegetation. (8+5)

Or

(b) Classify and briefly explain the various types of air pollutants.

12. (a) Explain with a neat sketch the types of Plume behaviour.

Or

(b) Explain the meteorological factors affecting air pollution.

13. (a) (i) What are the advantages and disadvantages of electrostatic precipitators? (5)

(ii) Write short note on the settling chamber. (8)

Or

(b) Design a parallel plate ESP with an efficiency of 90, 99 and 99.9% of removal of $0.75\mu m$ sized fly ash from a cement industry with gas flow rate of $10 m^3/sec$. Pilot plant studies showed that drift velocity $V_p = 2.5 \times 10^5 dp$ m/sec.

14. (a) (i) Write the general principle involved in absorption. (6)

(ii) Explain in brief the principle behind Condensation. (7)

Or

(b) Explain briefly the methods of the biological air treatment system.

15. (a) Make a note of pollution control measures in a thermal power plant.

Or

(b) List out the control measures carried out in the petroleum refining unit.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the significance of the wind rose diagram. (15)

Or

(b) Explain how different atmospheric conditions give rise to a different kind of plume. (15)

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50541

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Fifth/Eighth Semester

Electrical and Electronics Engineering

EE 8591 — DIGITAL SIGNAL PROCESSING

(Common to : Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define energy and power signals.

2. State sampling theorem.

3. State the Parseval's relation of the z – Transform.

4. Give the Discrete Time Fourier Transform pair equations.

5. State any two properties of DFT.

6. Compare the number of multiplications required to compute DFT of a 64-point sequence using direct computation and that using FFT.

7. Write the equation of Hamming window.

8. What is prewarping?

9. Compare floating-point and fixed-point digital signal processors.

10. List any four commercial digital signal processors.

PART B — (5 × 13 = 65 marks)

11. (a) How will you classify the systems based on their properties? Describe each class with their properties. (13)

Or

(b) Elaborate the steps involved in converting analog signals to digital signals, and the errors associated with these processes. (13)

12. (a) (i) Determine the z – transform of the signal $x(n)=(-1)^n u(n)$ and sketch the ROC. (7)

(ii) Find the causal signal $x(n)$ if its z – transform $X(z)$ is given by $X(z)=\dfrac{1+3z^{-1}}{1+3z^{-1}+2z^{-2}}$. (6)

Or

(b) (i) A linear time-invariant system is characterized by the system function $H(z)=\dfrac{3-4z^{-1}}{1-3.5z^{-1}+1.5z^{-2}}$. Specify the ROC of $H(z)$ and determine $h(n)$ for the following conditions (6)

- The system is stable
- The system is causal

(ii) Determine the convolution of the following pair of signals by means of the z – Transform. (7)

$$x_1(n)=\left(\frac{1}{4}\right)^n u(n-1),\ x_2(n)=\left[1+\left(\frac{1}{2}\right)^n\right]u(n)$$

13. (a) Compute the eight-point DFT of the sequence $x(n)=\{1,2,3,4,4,3,2,1\}$ Using the in-place radix-2 decimation-in-time algorithm. (13)

Or

(b) Given $x(n)=2^n$ and $N=8$, find the DFT of $x(n)$ using DIF algorithm. (13)

14. (a) (i) Explain parallel form and cascade structures of IIR systems. (6)

(ii) Describe the procedure of designing linear phase FIR filters using windows. (7)

Or

(b) (i) Discuss the characteristics of the Butterworth filter with the equation of the order and pole positions. (6)

(ii) Describe the characteristics of various types of Chebyshev filters with necessary equations and diagrams. (7)

15. (a) Describe the functional modes of digital signal processors. (13)

Or

(b) Explain the addressing modes supported by digital signal processors. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Convert the analog filter with system function $H_a(s)=\frac{s+0.1}{(s+0.1)^2+9}$ into a digital IIR filter by means of the impulse invariant method. (15)

Or

(b) Convert the analog filter with system function $H_a(s)=\frac{s+0.1}{(s+0.1)^2+16}$ into a digital IIR filter by means of the bilinear transformation method. The digital filter is to have a resonant frequency of $\omega_r=\pi/2$. (15)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50538

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Fifth Semester

Electrical and Electronics Engineering

EE 8501 – POWER SYSTEM ANALYSIS

(Regulations 2017)

Time : Three hours Maximum : 100 marks

(Codes / Tables / Charts to be permitted, if any, may be indicated)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define bus impedance matrix.
2. List the advantages of per unit computations.
3. What is P-Q bus in power flow analysis?
4. What do you mean by flat voltage start?
5. What is the need for short circuit analysis?
6. Define bolted fault.
7. What are symmetrical components?
8. List the various types of unsymmetrical faults.
9. Define power angle.
10. State equal area criterion.

PART B — (5 × 13 = 65 marks)

11. (a) Obtain PU impedance diagram of the power system of figure. Choose base quantities as 15 MVA and 33 KV.

Generator: 30 MVA, 10.5KV, X"= 1.6 ohms. Transformers T_1 and T_2: 15 MVA, 33/11 KV, X = 15 ohms referred to HV.

Transmission line: 20 ohms / phase. Load: 40 MW, 6.6 KV, 0.85 lagging p.f.

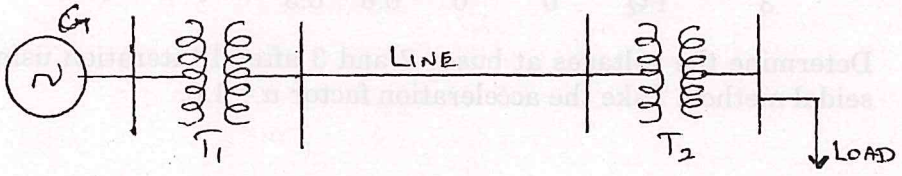


Fig. 11 (a)

Or

(b) Form Y-bus of the system shown in Fig. 11(b) using singular transformation method. The impedance data is given in the table. Take bus 1 as reference node.

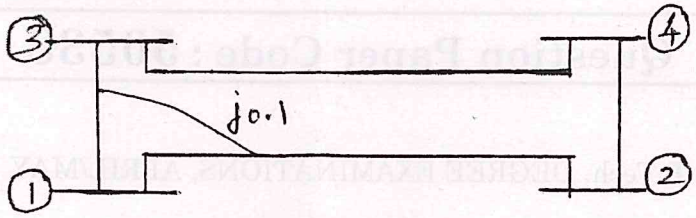


Fig. 11(b)

Element No.	Self		Mutual	
	Bus Code	Impedance (p.u.)	Bus Code	Impedance (p.u.)
1	1-2	0.5		
2	1-3	0.6	1-2	0.1
3	3-4	0.4		
4	2-4	0.3		

12. (a) Prepare the load flow algorithm using gauss seidal method with the flowchart and discuss the advantages of the method.

Or

(b) A three bus power system is shown in Fig. 12(b) and its data's are given in the table.

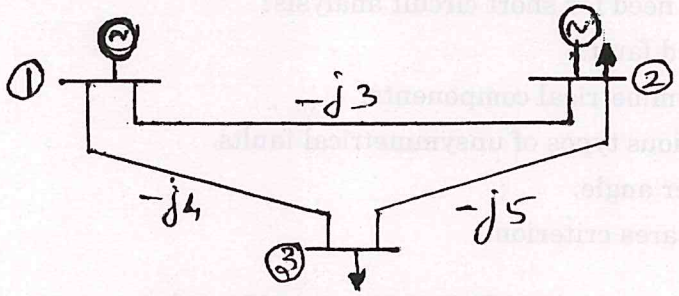


Fig. 12(b)

Bus No.	Type	Generation		Load		Bus Voltage	
		P_G	Q_G	P_L	Q_L	V	δ
1	Stack	-	-	-	-	1.02	0
2	PQ	0.25	0.15	0.5	0.25	-	-
3	PQ	0	0	0.6	0.3	-	-

Determine the voltages at buses 2 and 3 after 1st iteration using gauss-seidal method. Take the acceleration factor $\alpha = 1.6$.

13. (a) Explain the step by step procedure to find the fault current of three phase symmetrical fault current by using Thevenin's theorem.

Or

(b) For the radial network shown in Fig. 13 (b), a three phase fault occurs at point F. Examine the fault current.

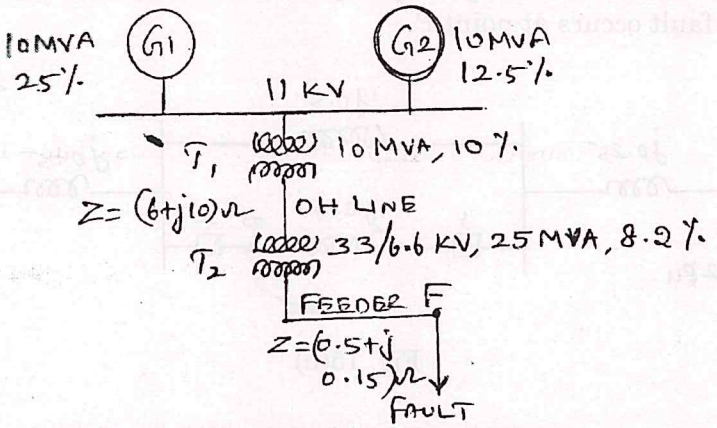


Fig. 13 (b)

14. (a) A single line to ground fault occurs at bus 4 of the system shown in Fig. 14(a). (i) Draw the equivalent networks (ii) Compute fault current.

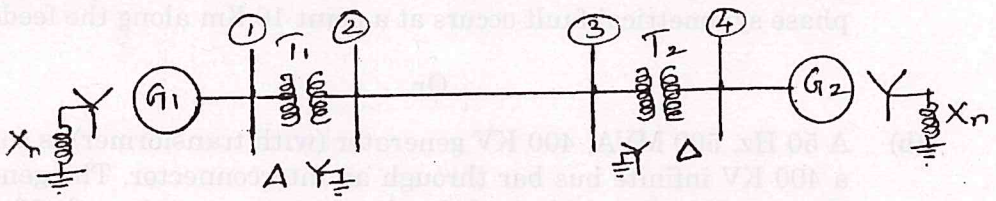


Fig. 14(a)

G_1, G_2: 100 MVA, 20 kV, X'=X" = 20%, X_0 = 4%, X_n = 5%

T_1, T_2: 100 MVA, 20/345 kV, X_{leak} = 8% on 100 MVA

Tr. Line: X' = X" = 15%, X = 50% on a base of 100 MVA, 20kV.

Or

(b) Derive the expression for fault current for a double line to ground fault in an unloaded generator in terms of symmetrical components.

15. (a) Describe the equal area criterion for transient stability analysis of a system.

Or

(b) Given the system of Fig. 15(b) shown below where a three phase fault is applied at a point P as shown. Examine the critical clearing angle for clearing the fault with simultaneous opening of the breakers 1 and 2. The reactance values of various components are indicated in the diagram. The generator is delivering 1.0 p.u. power at the instant preceding the fault. The fault occurs at point P.

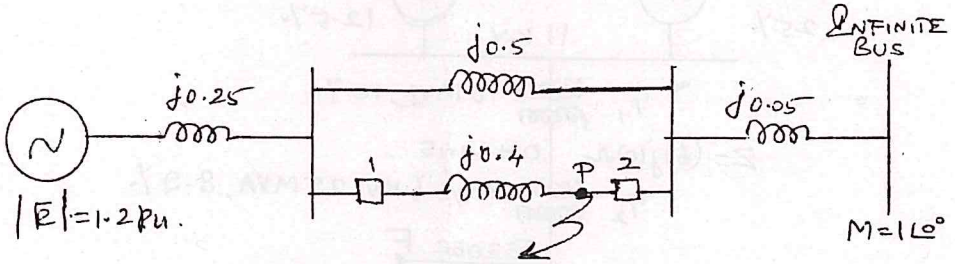


Fig. 15(b)

PART C — (1 × 15 = 15 marks)

16. (a) A 3-phase 6 MVA, 6.6 KV alternator with a reactance of 12% is connected to a feeder of series impedance (0.10+j0.5) ohm/phase/Km through a step up transformer. The transformer is rated at 3 MVA, 6.6 KV/33KV and has a reactance of 7%. Determine the fault current supplied by the generator operating under no load with a voltage of 6.9 KV when a three phase symmetrical fault occurs at a point 16 Km along the feeder.

Or

(b) A 50 Hz, 500 MVA, 400 KV generator (with transformer) is connected to a 400 KV infinite bus bar through an interconnector. The generator has H = 2.5 MJ/MVA. Voltage behind transient reactance of 450 KV and is loaded 460 MW. The transfer reactances between generator and bus bar under various conditions are: Prefault 0.5 p.u., During Fault 1.0 p.u., Post fault 0.75 p.u. Calculate the swing curve using intervals of 0.05 sec and assuming that the fault is cleared at 0.15 sec.

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50540

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Fifth Semester

Electrical and Electronics Engineering

EE 8552 — POWER ELECTRONICS

(Common to : Mechatronics Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define ODF in a power BJT.

2. *"Snubber circuit for an SCR should primarily consist of capacitor only But, in actual practice, a resistor is used in series with the capacitor"*- Interpret.

3. What is the relation between α, β and γ in single-phase fully controlled rectifier when operating with RL load?

4. What are the influences of pulse number of phase-controlled rectifiers on their output voltage ripple content?

5. What is a time ratio control?

6. A chopper is operating at a frequency of 2kHz on a 230V DC input, if the load voltage is 150V, calculate the conduction and non-conduction periods of thyristor in each cycle.

7. Mention the types of UPS.

8. What is meant by overmodulation in SPWM? Mention its necessity.

9. A single-phase voltage controller has input voltage of 230V, 50Hz and a load of $R = 15\,\Omega$. For 6 cycles ON and 4 cycles OFF, determine the rms value of output voltage

10. A three phase six-pulse, 50 kVA, 415 V cycloconverter is operating at a firing angle of 450 and supplying load of 0.8 power factor. Determine input current to the converters.

PART B — (5 × 13 = 65 marks)

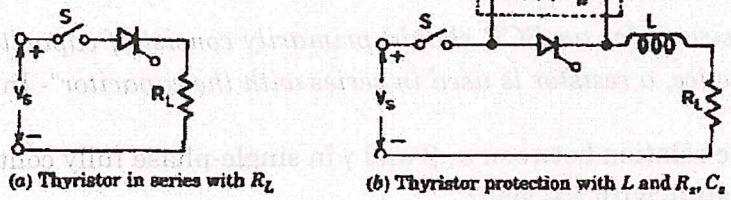
11. (a) (i) Discuss the basic structure and working of power IGBT. (6)

(ii) Draw the two-transistor model of SCR and derive an expression for anode current. (7)

Or

(b) (i) Explain in details the different SCR commutation methods. (9)

(ii) The figure shown beneath shows a thyristor controlling the power in a load resistance R_L. The supply voltage is 240 V dc and the specified limits for di/dt and dv/dt for the SCR are 50 A/μs and 300V/μs respectively. Determine the values of the di/dt inductance and the snubber circuit parameters R_S and C_S. (4)



(a) Thyristor in series with R_L (b) Thyristor protection with L and R_s, C_s

12. (a) Explain the single phase fully controlled rectifier while feeding a load current of severe discontinuity. (13)

Or

(b) (i) Explain the effect of source inductance in the performance of the single-phase fully controlled rectifier. (9)

(ii) Discuss the involvement of phase-controlled rectifiers in light dimmer application. (4)

13. (a) (i) With help of circuit diagram and waveforms explain the principle of working of boost converter. (8)

(ii) For a class chopper working with resistive load of R ohms, input voltage of V_{dc} and duty cycle α, express the following variables as functions of R, V_{dc} and α. (1 × 5 = 5)

(1) Average output voltage and *current*

(2) Output current at the commutation

(3) Average and RMS freewheeling diode currents

(4) RMS value of output voltage

(5) Average and RMS load currents

Or

(b) (i) Describe the working of L-type ZCS resonant dc to dc converter. (5)

(ii) Explain the working of class A chopper and arrive the output voltage relation. Also perform the steady state time domain analysis and obtain the output current equation. (8)

14. (a) (i) Draw the circuit diagram of 1ϕ auto sequential commutated current source inverter and explain its operation with equivalent circuits for different modes and necessary waveforms. (10)

(ii) Write short notes on the principle of UPS. (3)

Or

(b) Explain the principle of space vector PWM applied to three phase VSI using the space vector diagram. (13)

15. (a) Explain the basic principle of operation of a three-phase to single phase cycloconverter with circuit diagram and waveforms. Identify and mark the durations of rectification and inversion modes of converter groups for the *assumed load* angle. Obtain the fundamental rms value of output voltage/phase for an m-pulse cycloconverter. (13)

Or

(b) (i) With the suitable circuit, discuss about the matrix converter. (7)

(ii) A $1-\Phi$ AC voltage controller *has, a* resistive load of R = 10 Ω and input voltage is V_S = 120 V, 60 Hz the delay angle of thyristor T_1 is $\alpha = \frac{\pi}{2}$. Determine, (6)

(1) the rms value of output voltage V_0

(2) the input PF and

(3) the average input current.

PART C — (1 × 15 = 15 marks)

16. (a) (i) The buck regulator has an input range of V_S = 12 V. The regulated average output voltage is V_a = 5 V at R =500 Ω and the peak to peak output ripple voltage is 20 mV. The switching frequency is 25 kHz if the peak to peak ripple current of inductor is limited to 0.8 A determine (10)

(1) The duty cycle, K

(2) The filter inductance, L

(3) The filter capacitance, C and the critical value of L and C.

(ii) A single phase two pulse bridge converter feeds power to RLE load with R = 10 Ω, L = 10 mH E = 100 V, ac voltage is 250V, 50 Hz for continuous conduction. Find the average value of load current for a firing angle of 50°. In case one of the SCR's gets open circuited, find the new value of average load current assuming the output current as continuous. (5)

Or

(b) (i) A three-phase to single-phase cycloconverter employs a six-pulse bridge circuit and fed from 400V, 50Hz supply through a delta/star connected transformer whose per phase turns ratio 3:1. For a output frequency of 2Hz, the load reactance is $\omega_o L$ = 3 Ω. The load resistance is 4 Ω. The commutation overlap and thyristor turn-off limit the firing angle in the inversion mode to 165°. Compute (7)

(1) Peak value of rms output voltage

(2) rms output current

(3) output power

(ii) For a single-phase voltage controller feeding a resistive load, show that power factor is given by the expression $\left[\frac{1}{\pi}\left\{(\pi-\alpha)+\frac{1}{2}\sin 2\alpha\right\}\right]^{1/2}$. (8)

Reg. No. : | | | | | | | | | | | |

Question Paper Code : 90492

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Sixth Semester

Electrical and Electronics Engineering

EE 8005 — SPECIAL ELECTRICAL MACHINES

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is holding torque in stepping motors?

2. Why does stepper motor work in external logic circuit?

3. What is the significance of closed loop control in switched reluctance motor?

4. Write the torque equation of switched reluctance motor.

5. What is the effect of demagnetization in brushless PMDC motors?

6. List the types of materials used in PMBLDC motors.

7. How is permanent magnet synchronous motor started?

8. What are slotless motors?

9. Define transverse edge effect.

10. State the advantages of linear induction motor.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Describe the operation of a variable reluctance type stepper motor. (6)

(ii) What is stepping angle? Calculate the stepping angle for a 3-phase, 24-pole permanent magnet type stepper motor. (7)

Or

(b) (i) Explain with neat diagram the bipolar drive circuits in stepper motor. (6)

(ii) Explain the working of hybrid motor. (7)

12. (a) (i) Discuss the type of control strategy used in different regions of the torque speed characteristics of switched reluctance motor. (6)

(ii) Explain the importance of shaft position sensing of SR motor. (7)

Or

(b) Discuss the necessity of power electronic circuit in SR motor. Explain the different types.

13. (a) (i) Explain the magnetic characteristics of permanent magnet brushless DC motor. (6)

(ii) Derive the Torque equation of brushless DC motor. (7)

Or

(b) (i) Discuss about the power controllers used in PMBDC motor. (6)

(ii) A PMBLDC motor has a torque constant 0.12Nm/A referred to DC supply. Find no load speed when connected to 48V DC supply. Find stall current and stall torque if armature resistance = 0.15 Ω/phase and drop in controller transistors is 2V. (7)

14. (a) (i) Derive the emf equation of permanent magnet synchronous motor. (6)

(ii) A three phase 16 pole synchronous motor has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 wb, sinusoidally distributed and speed is 375 rpm . Find the frequency and phase and line emf. Assume full pitched coil. (7)

Or

(b) Explain about (i) Torque speed characteristics (ii) Microprocessor based control system, in permanent magnet synchronous motor. (6+7)

15. (a) (i) Explain the principle and operation of a linear induction motor and draw its characteristics. (9)

(ii) Explain with diagram the magnetic Levitation. (4)

Or

(b) Explain the principle and operation of a DC linear motor and also explain its control techniques.

PART C — (1 × 15 = 15 marks)

16. (a) (i) What is the motor torque T_m required to accelerate the initial load of 10^{-4} kgm^2 from $\omega_1 = 200$ and $\omega_2 = 300$ rad/sec during 0.2 sec. Frictional load torque is 0.06 Nm. (7)

(ii) Explain the function of digital controllers in PMSM with an application. (8)

Or

(b) Explain the working of linear induction motor with reference to an application in detail.

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Question Paper Code : 90525

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Sixth Semester

Electrical and Electronics Engineering

EE 8601 – SOLID STATE DRIVES

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the torque equation governing motor load system.

2. Draw the speed torque characteristics of high speed hoist load.

3. Write the principle of current limit control used for chopper fed DC motor drive.

4. Justify the statement chopper based DC drive performance is better than controlled rectifier fed DC drive.

5. Why stator voltage control is suitable for speed control of induction motor with fan loads?

6. What are the advantages with vector control for induction motor drives?

7. Why self controlled synchronous motor drive is free from hunting oscillations?

8. Compare the performance between CSI and VSI fed synchronous motor drives.

9. What is the need for closed loop control in electric drives?

10. What are the factors to be considered for selection of converter for electrical drives?

PART B — (5 × 13 = 65 marks)

11. (a) How electric drive differs from electric motor? Develop a functional block diagram for electric drive and mention the key components and its functions.

Or

(b) Describe the multi quadrant operation of an electric drive with motor / load torque characteristics. Also discuss the effect of speed variation and speed reversal.

12. (a) Explain the principle of two quadrant operation in single phase fully controlled rectifier fed DC motor drive. Also derive the steady state speed – torque equation in continuous conduction mode.

Or

(b) Explain with neat illustrations, the operation of four quadrant chopper fed DC motor drive. Draw its speed – torque characteristics.

13. (a) Explain the principle of v/f control for induction motor drive. How it is realized with voltage source inverters?

Or

(b) Explain with power circuit, how slip power recovery scheme helps to achieve sub synchronous speed control of slip ring induction motor with an improvement in overall efficiency.

14. (a) Explain the principle of self – control for synchronous motor drive in detail with necessary illustrations. Compare self control with v/f control.

Or

(b) Draw the power circuit for current source inverter fed synchronous motor drive and explain its operation.

15. (a) Derive the expression for transfer function of separately excited DC motor with armature voltage control scheme.

Or

(b) Explain how current controller and speed controllers are designed for electric drives with suitable mathematical expressions.

PART C — (1 × 15 = 15 marks)

16. (a) A 230 V, 960 rpm and 200 A separately exited DC motor has an armature resistance of 0.002 Ω. The motor is fed from a chopper which provides both motoring and breaking operations. The source has a voltage of 230V. Assume continuous conduction.

(i) Calculate duty ratio of chopper for motoring operation at rated torque and 350 rpm.

(ii) Calculate duty ratio of chopper for breaking operation at rated torque and 400 rpm.

Or

(b) Examine the operating regions of torque – speed curves for a variable speed induction motor drive with a variable – frequency, variable – voltage AC supply form PWM inverter.

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Question Paper Code : 90526

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Sixth Semester

Electrical and Electronics Engineering

EE 8602 — PROTECTION AND SWITCHGEAR

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define positive sequence component and zero sequence component.

2. State the various types of unsymmetrical faults.

3. What are over current and under current relays?

4. Mention any two applications of differential relay.

5. What are the uses of Buchholz's relay?

6. What are the faults associated with a transformer?

7. What are the limitations of a static relay?

8. List the types of static relays.

9. Give the advantages of SF_6 circuit breaker over air blast circuit breaker.

10. Which factors the ARC phenomenon depends upon?

PART B — (5 × 13 = 65 marks)

11. (a) Discuss the Nature and Causes of Faults in a power system.

Or

(b) Explain the method of resistance and reactance grounding of the power system with neat sketch.

12. (a) Discuss in detail about various types of electromagnetic relays.

Or

(b) With neat diagram, explain the construction and operation of Non Directional over current relay.

13. (a) Write a detailed note on Motor Protection with neat sketch.

Or

(b) Explain about the following

(i) Faults occur in generator. (6)

(ii) Merz-Price protection of a generator. (7)

14. (a) Discuss about the block diagram of numerical relay with neat sketch with its advantages and limitations.

Or

(b) Describe with neat block diagram the working of transformer differential protection.

15. (a) Explain the construction, operating principles of SF_6 circuit breaker with neat diagram.

Or

(b) Explain with neat sketch the construction, operating principle of minimum oil circuit breaker with its merits and demerits.

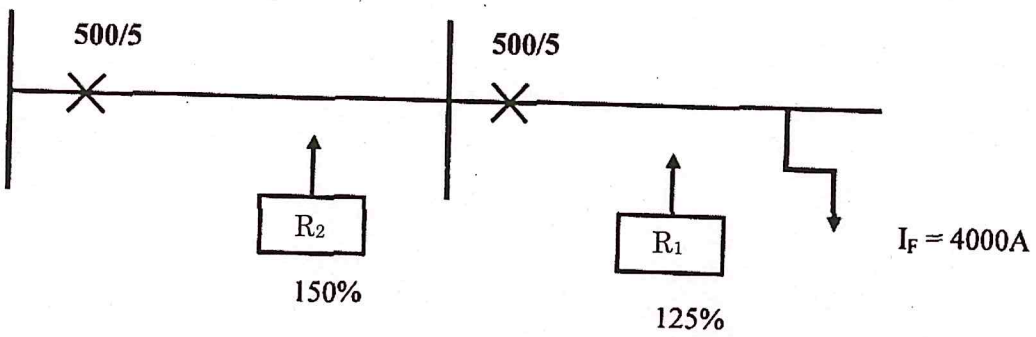
PART C — (1 × 15 = 15 marks)

16. (a) A 6.6 kV star connected alternator has a transient reactance of 2Ω per phase and negligible winding resistance. it is protected by a circulating current Merz-Price protection. The alternator neutral is earthed through a resistance of 7.5Ω. The relays are set go operate when there is out-of-balance current of 1A in secondary of 500/5 A current transformers. How much% of winding is protected against earth fault?

Or

(b) It is given that fault current is 4000A; R_1 is set on 125%; R_2 is set on 150%; for discrimination the time grading margin between the relays in 0.6 seconds. Determine the operating time of relay 1 and time multiplier setting of relay 2 and time multiplier setting for relay R_1 is 0.3

Plug setting Mulitplier	2	3.6	5	8	10	15	20
Time in seconds for a time multiplier of one	10	6	4	3.15	2	2	2



Plug setting Multiplier	2	3.0	6	8	10	15	20
Time in seconds for a time multiplier of one	10	5	4	3.15	2	2	2

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Question Paper Code : 90527

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Sixth/Seventh/Eighth Semester

Electrical and Electronics Engineering

EE 8691 — EMBEDDED SYSTEMS

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give two features that differ an embedded processor from a general purpose processor.

2. What are role of watchdog timer and real time clock?

3. What is voltage arbitration in Bus communication?

4. Name the Bus suitable for broadcast and for peer to peer Communication.

5. Why does program complexity increase with reduced number of DFGs and increasing nodes?

6. What is use of simulator in a development phase?

7. Compare in-system (ISP) and In-Application Programming(IAP).

8. What are the cause for deadlock situation in RTOS?

9. Why are Tasks ranked in a RTOS based system?

10. Why are digital keys used by smart cards stored in PROM?

PART B — (5 × 13 = 65 marks)

11. (a) Draw neatly discuss on the internal block diagram of a Typical Embedded processor and on memory devices for it. (13)

Or

(b) Write on any TWO to explain the added advantage achieved by inclusion of (13)

(i) DMA for peripheral interface (5)

(ii) Cache memory replacement policy (4)

(iii) Associative mapping (4)

12. (a) Describe the IIC type of the serial communication BUS with describing its frame format in communication. (13)

Or

(b) Describe the CAN Bus , frame formats and communication protocol features of CAN that make it an error free field bus. (13)

13. (a) Discuss on (6 + 7)

(i) Controlled data flow graph (6)

(ii) Sequential Program Model (7)

Or

(b) Explain briefly on the different phases of EDLC. (13)

14. (a) Write briefly on *any two:* (13)

(i) Semaphores (4)

(ii) Task process and threads (5)

(iii) Message, Mail (4)

Or

(b) Write briefly on :

(i) Round Robin Scheduling (7)

(ii) Preemptive Scheduling (6)

15. (a) Considering an example of a Digital Camera discuss on how RTOS deployment with it improves the performance. (13)

Or

(b) Considering one example of either a ATM machine/ Washing machine discuss on the embedded automation for the chosen case study. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain briefly on how to involve Scheduling and Interprocess Communication involvement by considering the example of a Automotive application. (15)

Or

(b) Discuss briefly on Integrated Development with compiler and Debugger for the design of one typical embedded application. (15)

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90489

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Sixth Semester

Electrical and Electronics Engineering

EE 8002 – DESIGN OF ELECTRICAL APPARATUS

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Assume missing data wherever necessary.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the limitations imposed on the design of electrical machines.

2. Give the expression of computing magnetizing current for concentrated winding.

3. Prove that Volts/turn = $K(S)^{½}$

4. Why are distribution transformers designed to have maximum efficiency at load quite lower than the full load?

5. Write the expression for copper in armature winding of a DC machine.

6. Write the methods of finding D^2L of a DC machine.

7. Give the typical values of L/τ to have good efficiency, minimum cost and good overall design of three phase induction motor.

8. Why the length of air gap in induction motor is kept minimum possible whereas in a dc machine it is larger?

9. Mention the reason why higher voltages are possible to be generated in an alternator compared to a dc generator.

10. Give the reasons of the presence of harmonics in the output voltage waveform of a synchronous generator and what means are adopted to minimize them.

PART B — (5 × 13 = 65 marks)

11. (a) Deduce the expressions for the leakage reactance of

(i) semi-enclosed parallel sided slot having single layer winding (6)

(ii) circular slot (7)

Or

(b) Develop the winding table and draw the winding diagram of a 4 pole, 15 slot double layer simplex wave winding for a dc generator. Also show the brush positions. (13)

12. (a) Calculate the kVA output of a single phase transformer from the following data:

height of window/Distance between core centers = 2.8, Dia of circumscribing circle/distance between core centers = 0.56, Net iron area/area of circumscribing circle = 0.7, Current density = 2.3 A/mm^2, window space factor = 0.27, frequency = 50 Hz and flux density in core = 1.2 Wb/m^2. (13)

Or

(b) Determine the main dimensions of the core for a 250kVA, 6.6kV/415V, 50Hz. 3 phase section of the windings. (13)

Assume the following: Approximate volts/turn = 9, B_{max}= 1.25 Wb/m^2, A_i = 0.62d^2, window space factor = 0.27, Height of window = 2W_w, current density = 250A/cm^2 and width of lamination = 0.92d

13. (a) (i) Derive the output equation of DC machines. (6)

(ii) List the pros and cons of having more number of poles. List the guidelines for selecting the number of poles. (7)

Or

(b) Design a commutator giving details of brushes having regard to commutation and temperature rise for a 1000kW, 500V, 10 pole, 270 rpm DC machine. The armature diameter 160cm has 450 coils.

Assume the following: Commutator dia 0.62 of armature dia, Commutator peripheral speed 16m/sec, Commutator pitch 4mm, Brush current 65A, Current density in brushes 7A/cm^2, Brush drop = 2V, Brush pressure = 1250 kg/m^2 and Temperature rise 40°C. (13)

14. (a) (i) Derive the output equation of three phase induction motor. (6)

(ii) Discuss the factors affecting the choice of specific electric and magnetic loadings. (7)

Or

(b) Discuss the circle diagram as obtained from the design parameters and its use to obtain the performance characteristics of a 3 phase induction motor. (13)

15. (a) What is meant by SCR of an alternator? Discuss its significance in relation to stability, voltage regulation and practical operation of synchronous generators. (13)

Or

(b) (i) Determine suitable values of diameter of air gap, core length and peripheral speed for a 2.5MVA 3.3kV, 32 pole, 50Hz vertical shaft water wheel generator using the following data:

Specific magnetic loading = 0.68Wb/m^2, specific electric loading = 30000ac/m, ratio of pole arc to pole pitch for the circular poles = 0.65. (10)

(ii) If the runaway speed is to be limited to twice the normal speed, suggest type of pole construction. (3)

PART C — (1 × 15 = 15 marks)

16. (a) Discuss in detail the step by step design procedure adopted for shunt winding field system of a D.C machine. (15)

Or

(b) In two synchronous machines running at the same speed and having the same number of poles, the physical dimensions are in the ratio 3:2. Compare the outputs, armature copper losses and iron losses in the two machines. Assume specific magnetic loading and current density to be same for both the machines. (15)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90505

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022

Seventh/Eighth Semester

Electrical and Electronics Engineering

EE 8018 – MICROCONTROLLER BASED SYSTEM DESIGN

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Difference between the Von-Neumann and Harvard architecture.
2. What is meant by instruction pipelining?
3. Difference between a subroutine and interrupt service routine.
4. What is the use of the key switch subroutine?
5. How do you check if EEPROM is working?
6. What is the nominal UART baud rate in PIC 16C6x/7x?
7. Difference between RISC and CISC machine.
8. What is the difference between a big-endian and a little-endian data representation?
9. Draw the 5-stage pipeline ARM organization.
10. What is meant by memory bottleneck?

PART B — (5 × 13 = 65 marks)

11. (a) Explain in detail with a neat block diagram the architecture of PIC 16C7X.

Or

(b) Discuss in detail the register file structure and addressing modes of PIC 16C6x/7x.

12. (a) Describe in detail the Timer2 scaler initialization and IntService interrupts service routine.

Or

(b) (i) Discuss with a neat diagram about the Keypad and soft key interface. (6)

(ii) Describe the state machines and key switches. (7)

13. (a) Explain the I^2C bus operation and bus subroutines.

Or

(b) Describe in detail ADC and its use in PIC 16C6x/7x

14. (a) Discuss in detail with visible registers structure about the ARM programmer's model.

Or

(b) List the different types of ARM instructions and explain in detail the Data processing and control flow instructions.

15. (a) Explain with the neat diagram about the 3-stage pipeline ARM organization.

Or

(b) Discuss in detail the ARM floating-point architecture.

PART C — (1 × 15 = 15 marks)

16. (a) Design a PIC microcontroller-based Hearing AID system and explain it with a neat diagram.

Or

(b) Give the design methodology for designing of Electronic Voting Machine (EVM) an embedded computing system.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90530

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Seventh Semester

Electrical and Electronics Engineering

EE 8703 — RENEWABLE ENERGY SYSTEMS

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the factors influencing the amount of GHG emissions.

2. Comment on the present energy scenario of renewable energy in India.

3. Give the main components of the wind power plant.

4. Name any two important wind power plants in India.

5. Define collector efficiency.

6. Draw the equivalent circuit of a solar cell.

7. Name the constituents of biomass.

8. Define the geothermal gradient.

9. Write a note on wave energy.

10. Define the hybrid energy systems.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the role and importance of renewable energy sources in detail.

Or

(b) (i) Explain the significance of energy consumption as prosperity. (7)

(ii) List the advantages and limitations of renewable energy sources. (6)

12. (a) Compare the vertical axis wind turbine and horizontal axis wind turbine.

Or

(b) Generalize the factors to be considered for the siting to install the wind power plant.

13. (a) Discuss the construction and working principle of Central Receiver power plants.

Or

(b) Explain the Perturb and Observe MPPT algorithm with a flowchart.

14. (a) Discuss the biomass conversion technologies and explain any one in detail.

Or

(b) Describe the various components and working of the hydroelectric system.

15. (a) Briefly discuss the components of tidal power systems with a neat block diagram.

Or

(b) Describe the construction and working principle of a Hydrogen-Oxygen fuel cell.

PART C — (1 × 15 = 15 marks)

16. (a) Using the Betz model of the wind turbine, derive the expression for power extracted from the wind.

Or

(b) Explain the closed-cycle OTEC system with a neat diagram.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90529

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Seventh Semester

Electrical and Electronics Engineering

EE 8702 — POWER SYSTEM OPERATION AND CONTROL

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List out the requirements of good power system.

2. Write the significance of load curves.

3. Define frequency bias tie-line control.

4. Enumerate the co-ordination between LFC and economic dispatch.

5. Name the devices adopted for reactive power generation.

6. Define the term 'stability compensation'.

7. Draw the input and output characteristics of thermal plant.

8. List the thermal constraints of UC problem.

9. Write the significance of energy control centers.

10. Draw the state transition diagram.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Discuss the power scenario in Indian grid and the role of national and regional load dispatching centers. (7)

(ii) Write short notes on P-V and Q-F control loops. (6)

Or

(b) With relevant block diagram explain the basics of speed governing mechanisms, modeling and speed characteristics in detail.

12. (a) Explain the static and dynamic analysis of controlled and uncontrolled cases of single area system.

Or

(b) Explain the static and dynamic analysis of two area system.

13. (a) Draw the block diagram representation of AVR loop and explain the function of each component.

Or

(b) With neat diagrams explain the various methods of voltage control.

14. (a) Explain the optimal operation of thermal units with and without transmission losses.

Or

(b) (i) Draw the flowchart for priority list method. (7)

(ii) Discuss the special aspects of short term and long term hydrothermal problems. (6)

15. (a) Explain the hardware configuration and functions of SCADA.

Or

(b) Write the algorithm for state estimation problem using weighted least square method.

PART C — (1 × 15 = 15 marks)

16. (a) A 50 Hz, 4-pole turbo generator is rated 500 MVA, 22 kV and has an inertia constant (H) of 7.5. Assume that the generator is synchronized with a large power system and has a zero accelerating power while delivering a power of 450 MW. Suddenly its input power is changed to 475 MW. Find the speed of the generator in rpm at the end of a period of 10 cycles. The rotational losses are assumed to be zero.

Or

(b) In a three plant system the cost functions are given by

$F_1 = 400+6.8P_1+0.002P_1^2$,

$F_2 = 300+6.7P_2+0.003P_2^2$

$F_3 = 100+7.2P_3+0.005P_3^2$

While the transmission loss is expressed as

$P_t = 0.00002P_1^2+0.00006P_2^2+0.0001P_3^2$

Assume total load to be 750W, Find the economic dispatch schedule.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90528

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Seventh Semester

Electrical and Electronics Engineering

EE 8701 – HIGH VOLTAGE ENGINEERING

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define corona critical disruptive voltage.

2. What are the methods employed for protection of overhead lines against lightning?

3. What is mean free path?

4. Why should the electrode surface not have sharp points?

5. Name the methods used to generate high voltage DC.

6. Differentiate impulse voltage and switching surge.

7. What is the use of Rogowski coil?

8. What are the advantages of electrostatic voltmeter?

9. Define creepage distance.

10. Why is the impulse test important for power transformer?

PART B — (5 × 13 = 65 marks)

11. (a) (i) How is the lightning modeled mathematically? (5)

(ii) Explain the methods of switching surge formation in detail. (8)

Or

(b) (i) Explain the procedure to draw Bewley Lattice Diagram for a two Substations system. (8)

(ii) Explain briefly about expulsion type arrester. (5)

12. (a) Explain the mechanisms involved in composite and vaccum dielectric breakdown.

Or

(b) Describe the Townsend's theory involved in gaseous breakdown and derive the breakdown criteria.

13. (a) Describe the construction and operation of vande graff generator from the first principle with neat sketch and also give the limitations.

Or

(b) Design and explain the cock craft Walton multiplier circuit for high DC voltage generation and derive the expression for optimum number of stages.

14. (a) Explain the measurement of high voltage using generating voltmeters and give the factors affecting the measurement.

Or

(b) With neat diagram, discuss the operation of CVT and resistive shunts deployed for measurements.

15. (a) Describe the various tests conducted on circuit breakers.

Or

(b) Explain the tests conducted on bushings and power cables.

PART C — (1 × 15 = 15 marks)

16. (a) (i) With suitable diagram show that the deflecting torque of an electrostatic voltmeter is proportional to the product of the square of the applied voltage and the rate of change of capacitance. (8)

(ii) Analyse with suitable diagrams, why a potential divider connected at the output of an impulse generator needs to be matched to the cable connecting it to an oscilloscope and how matching may generally be achieved. (7)

Or

(b) (i) Analyse the construction and operation of triggering and control setup used for impulse generator. (9)

(ii) An impulse generator has 8 stages with each condenser rated for 0.16 μF and 125 KV. The load capacitor available is 1000 pF. Find the series resistance and damping resistance needed to produce 1.2/50 μs impulse wave. What is the Maximum output voltage of the generator, if the charging voltage is 120 KV? (6)