F 2970 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch—Common to all Branches

EN 010 302—ECONOMICS AND COMMUNICATION SKILLS

[AI, AN, AU, CE, CS, EC, EE, EI, IC, IT, ME, PE and PO]

(New Scheme—Regular/Improvement/ Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 marks.

1. What are the functions of stock markets ?
2. Mention any *six* MNC's working in India.
3. What do you mean by progressive and regressive taxes ?
4. What are the difficulties in estimating national income ?
5. What do you mean by BOP ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 marks.

6. Explain the credit control system of RBI.
7. Comment on LPG (Liberalisation, Privatisation and Globalisation).
8. What are the major functions of taxation system ?
9. Explain the major causes of inflation in a country.
10. Comment on the impact of WTO decisions on Indian industries.

(5 × 5 = 25 marks)

Part C

Answer any one **full** *question.*
Each question carries 12 *marks.*

11. Explain the role of National banks for the agriculture and rural development.

Or

12. Banker's bank of India is RBI. Explain.

Turn over

13. Comment on the effects of MNC's in growth of India.

Or

14. The growth of IT industry is essential for India. Explain the reasons.

15. The major source of a nation is taxation system. Give reasons.

Or

16. Write notes on (a) Direct and indirect taxes ; (b) Tax evasion ; and (c) Deficit financing.

17. Explain the methods of estimating National Income.

Or

18. What are the measures of controlling inflations ? Explain.

19. Explain the causes of disequilibrium in India's Balance of payments (BOP).

Or

20. Comment on the effects TRIPS and TRIMS in the Indian economy.

(5 × 12 = 60 marks)

F 2983 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

EE 010 304—ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS (EE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. List the advantages and disadvantages of induction instrument.
2. What are the factors which affect the value of earth resistance ?
3. What is meant by standardisation in slide wire potentiometer ?
4. Discuss how errors in current transformer are minimised.
5. What are permeameters ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Obtain the expression for deflecting torque and comment on the scale shape of moving iron instrument.
7. Discuss the measurement of capacitance of an imperfect capacitor using wien bridge.
8. Explain the loss of charge method for measurement of high resistances.
9. Obtain the expression for ratio and phase angle error in potential transformer.
10. Describe the method of determination of BH curve of a magnetic material.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. (a) Discuss different types of damping in indicating instruments. (8 marks)

    (b) The meter element of a PMMC instrument has a resistance of 5Ω and requires 15 mA for full scale deflection. Calculate the resistance to be connected (i) in parallel to enable the instrument to read upto 1 A ; (ii) in series to enable it to read upto 15 V. (4 marks)

Or

Turn over

12. (a) Discuss the construction and working of PMMC instrument. (8 marks)

(b) A 15 V moving iron voltmeter has a resistance of 300 Ω and an inductance of 0.12 H. Assume that the voltmeter reads correctly on d.c., what will be the percentage error when the instrument is used in 15 V a.c. supply at 100 Hz. (4 marks)

13. (a) Draw the diagram of vernier potentiometer and explain its working. (7 marks)

(b) Explain the method of measurement of resistance using Wheatstone bridge. (5 marks)

Or

14. (a) Describe with the help of suitable diagram, how a potentiometer can be used for calibration of voltmeter. (7 marks)

(b) Obtain the balance equations for Maxwell's inductance bridge. (5 marks)

15. (a) Explain the construction and operation of Dynamometer type wattmeter. (8 marks)

(b) A 50 A, 230 V energymeter on full-load makes 61 revolutions in 37 seconds. If the meter constant is 520 rev/kWh, find the percentage error. (4 marks)

Or

16. Write short notes on the following :—

(a) Electronic energymeter.

(b) Trivector meter.

(2 × 6 = 12 marks)

17. Explain the construction of current transformer. Draw its phasor diagram and obtain expressions for ratio and phase angle error.

Or

18. Explain the operation of :

(a) Electrical resonance frequency meter.

(b) Ratiometer type frequency meter.

(2 × 6 = 12 marks)

19. (a) Explain deflection systems in CRO. (8 marks)

(b) Draw the block diagram of dual beam CRO. (4 marks)

Or

20. (a) Describe the construction and operation of Fluxmeter. (8 marks)

(b) Draw the block diagram of dual trace CRO. (4 marks)

[5 × 12 = 60 marks]

F 2993 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

EE 010 305—ELECTRONICS CIRCUITS (EE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Define load line. Explain how to plot it.
2. Make comparison table of common base versus common emitter transistor configurations.
3. Define efficiency of a power amplifier. Compare efficiency of different classes of power amplifiers.
4. List advantages and disadvantages of negative feedback on amplifier performance. How it affects various parameters of an amplifier ?
5. What is a Zener diode ? How it is employed in a shunt regulator ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. What is biased clipping ? Explain different biased clipping circuits using positive and negative biasing schemes with input output waveforms.
7. What is a Darlington pair ? Explain its working. Mention its need.
8. What is Q factor of a tuned amplifier ? Explain the factors and its significance that determine the Q-factor.
9. Explain the Barkhausen criteria of oscillations.
10. With necessary diagram, explain the working principle of a simple transistor sweep circuit.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. (a) Explain the characteristics of a JFET. (6 marks)

    (b) With diagram, explain the self biasing schemes used in JFET. Derive necessary equations relating voltage and current at various terminals.

(6 marks)

Or

Turn over

12. With necessary diagrams, explain any two biasing schemes used in MOSFET.

13. Sketch the *h*-parameter equivalent circuit of a two-stage RC coupled amplifier and derive equations of current gain, voltage gain, input and output impedances.

Or

14. With neat circuit diagrams, explain the working of a two-stage RC coupled amplifier and derive the output relation of each stage. Sketch the frequency response curve and discuss methods to improve gain bandwidth product.

15. With the help of circuit diagram, explain the operation of a push-pull power amplifier. Discuss the advantage of using such an arrangement.

Or

16. With neat sketches, explain the working of double tuned amplifier. Sketch its frequency response curve and compare its performance with single tuned amplifiers.

17. With circuit diagram, explain the operation of a voltage series feedback amplifier circuit.

Or

18. Explain with diagram, the operation of Hartley oscillator. Give the equation of frequency of oscillation.

19. Describe with circuit diagram, the working of an astable multivibrator. Give the analysis equations.

Or

20. With circuit diagram, explain the working principle of a bistable multivibrator. Sketch the output waveforms at both bases and collectors.

(5 × 12 = 60 marks)

F 3002 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

EE 010 306—MECHANICAL TECHNOLOGY (EE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Define the term radius of gyration of a floating body.
2. Explain the significances of critical Reynolds number.
3. What do you mean by reaction turbines ?
4. Define the term NPSH (Not Positive Suction Head).
5. What are the functions of air vessels in reciprocating pumps ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. How Pitot tubes are used in velocity measurements ?
7. Explain the working of rotameters in flow measurements.
8. With sketches, explain the effects of discharge and pressure when centrifugal pumps are connected in series and parallel.
9. Draw the different types of draft tubes. What are the effects of draft tube in reaction turbines ?
10. What is mean by cavitation in fluid machines ? How the cavitational effects can be reduced ?

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Explain the various types of pressure measuring devices.

Or

12. Write notes on (a) Surface tension ; (b) Dynamic viscosity ; (c) Bulk modulus.

13. With a neat sketch, explain the working of Keplan turbine.

Or

14. Explain the constructional details of a governer in a Francis turbine.

Turn over

15. From the Bernoulli's equation, derive an equation for the discharge through the venture meter.

Or

16. Explain how the actual discharge is measured by using (i) Triangular notch ; (b) Rectangular notch in a laboratory.

17. Explain the working of a centrifugal pump.

Or

18. Explain the main and operating characteristics of a centrifugal pump.

19. Derive an equation for accleration head when air vesels are fitted on suction side and delivery side.

Or

20. Explain the working of following positive displacement pumps (a) Screw pump ; (b) Vane pump ; (c) Rotary radial piston pumps.

(5 × 12 = 60 marks)

F 3008 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

MECHANICAL TECHNOLOGY (E)

(Supplementary/Mercy Chance—Old Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

1. State and explain Pascal's law.
2. Distinguish between Dynamic and Kinematic viscosity.
3. What do you mean by 'Critical Reynold's' number ?
4. Define 'Friction factor'.
5. What are the effects of cavitation ?
6. State the significance of 'degree of reaction'.
7. Briefly discuss : hydraulic balancing.
8. Define 'specific speed' of a centrifugal pump.
9. What do you mean by 'ideal indicator diagram' ?
10. Why is a reciprocating pump not coupled directly to the motor ?

(10 × 4 = 40 marks)

Part B

11. Find out the minimum size of glass tube that can be used to measure water level if the capillary rise in the tube is to be restricted to 2 mm. Consider surface tension of water in contact with air as 0.073575 N/m. (12 marks)

Or

12. The barometric pressure at sea level is 760 mm of mercury while that on a mountain top is 735 mm, if the density of air is assumed as 1.2 kg/m^3, what is the elevation of the mountain top ? (12 marks)

13. Derive Bernoulli's equation for the flow of an incompressible friction less fluid. (12 marks)

Or

14. Find the time required to lower the water level from 3 m to 2 m in a reservoir of dimension 80 m × 80 m by a rectangular notch of length 1.5 m. Take C_d = 0.62. (12 marks)

Turn over

15. Discuss the constructional details and characteristics of a Kaplan turbine. (12 marks)

Or

16. What are the different types of draft tubes ? Derive an expression for efficiency of a draft tube. (12 marks)

17. Discuss the main, operating and ISO efficiency characteristics of a centrifugal pump. (12 marks)

Or

18. Derive an expression for pressure rise in the impeller of a centrifugal pump when frictional and other losses in the impeller are neglected. (12 marks)

19. A double acting reciprocating pump, running at 50 r.p.m. is discharging 900 litres of water per minute. The pump has stroke of 400 mm. The diameter of piston is 250 mm. The delivery and suction heads are 25 m and 4 m respectively. Find the slip of the pump and power required to drive the pump. (12 marks)

Or

20. Explain the construction and working of a (a) Gear pump ; (b) Root pump ; and (c) Vane pump. (12 marks)

[5 × 12 = 60 marks]

F 2968 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Common to all Branches except CS and IT

EN 010 301-A—ENGINEERING MATHEMATICS—II

(CE, ME EE, AU, AN, EC, AI, EI, IC, PE AND PO)

[New Scheme—Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Evaluate grad $\left(\frac{1}{r}\right)$ where $r = |\bar{r}|$ and $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$.
2. If R is a region bounded by a simple closed curve C, then using Green's theorem show that the area of R is given by $\frac{1}{2}\oint_C [xdy - ydx]$.
3. Prove that $\Delta \log f(x) = \log\{1 + \Delta f(x)\}$.
4. What is numerical differentiation ? Explain.
5. Find $Z\{\sin(3n+5)\}$.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. If $\bar{f} = xyz\bar{i} + 3x^2y\bar{j} + (xz^2 - y^2z)\bar{k}$ find div $\bar{f}$ and curl $\bar{f}$ at (1, 2, 3).
7. If $\bar{F} = (3x^2 + 6y)\bar{i} - 14yz\bar{j} + 20xz^2\bar{k}$ evaluate $\int_C \bar{F} \cdot d\bar{r}$ from (0, 0, 0) to (1, 1, 1) along the path $x = t, y = t^2$ and $z = t^3$.
8. Prove that : (a) $E^{1/2} - \frac{1}{2}f - \mu = 0$ and (b) $\Delta = \frac{1}{2}f^2 + f\sqrt{1 + \frac{f^2}{4}}$.

Turn over

9. Solve $y_{x+2} - 4yx = 9x^2$.

10. Prove that $Z\left\{\frac{1}{n}\right\} = z \log \frac{z}{z-1}$.

(5 × 5 = 25 marks)

Part C

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module I

11. (a) Find the directional derivative of $\phi(x, y, z) = 4xz^3 - 3x^2yz^2$ at (2, –1, 2) along the z-axis.

(5 marks)

(b) Prove that $\operatorname{div}\{\bar{f} \times \bar{g}\} = \bar{g} \cdot (\operatorname{curl} \bar{f}) - \bar{f} \cdot (\operatorname{curl} \bar{g})$. (7 marks)

Or

12. (a) Prove that $\bar{f} = (2x + yz)\bar{i} + (4y + zx)\bar{j} - (6z - xy)\bar{k}$ is both solenoidal and irrotational. Also find the scalar potential of $\bar{f}$.

(7 marks)

(b) Prove that $\nabla^2\left\{\nabla \cdot \left(\frac{\bar{r}}{r^2}\right)\right\} = 2r^{-4}$. (5 marks)

Module II

13. Verify Stoke's theorem for $\bar{F} = y\bar{i} + z\bar{j} + x\bar{k}$, where S is the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$ and C its boundary.

(12 marks)

Or

14. Verify divergence theorem for $\bar{F} = 4xz\bar{i} - y^2\bar{j} + yz\bar{k}$ and S is the cube bounded by $x = 0, x = 1, y = 0, y = 1, z = 0$ and $z = 1$.

(12 marks)

Module III

15. Find y_{32} given y_{20} = 14.035, y_{25} = 13.674, y_{30} = 13.257, y_{35} = 12.734, y_{40} = 12.089 and y_{45} = 11.309.

(12 marks)

Or

16. Using Lagrange's interpolation formula obtain the polynomial from the following data :

x	:	0	1	3	4
y	:	–12	2	6	12

Hence determine y when x = 2 and x = 5.

(12 marks)

Module IV

17. From the following data find dy/dx and d^2y/dx^2 at x = 1.5.

x	:	1.0	1.1	1.2	1.3	1.4
y	:	43.1	47.7	52.1	56.4	60.8

(12 marks)

Or

18. Determine the value of $\int_0^1 e^{-x^2} dx$ correct to four places of decimals using Simpson's rule with h = 0.1.

(12 marks)

Module V

19. Using the inversion integral method find the inverse z transform of :

$$\frac{z(2z-1)}{2(z-1)\left(z+\frac{1}{2}\right)}.$$

(12 marks)

Or

20. Using z-transform solve $u_{n+2} - 2u_{n+1} + u_n = 3_{n+5}$. (12 marks)

[5 × 12 = 60 marks]

F 2976 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

EE 010 303—ELECTRIC CIRCUIT THEORY (EE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Explain the classification of sources.
2. Obtain the expression for the charging of a capacitor in an RC circuit connected to a DC voltage V.
3. Define graph, tree, co-tree and incidence matix.
4. What is a Hurwitz polynomial ? What are tis properties ?
5. What is meant by Neutral shift ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. State the prove Thevenin's theorem.
7. What are the advantages of MATLAB and SCILAB simulation of RLC circuits ?
8. Explain the terms Transient Response, Steady state response, zero Input Response and zero state response.
9. Check whether the polynomial given is Hurwitz or not ?

$$F(s) = s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4.$$

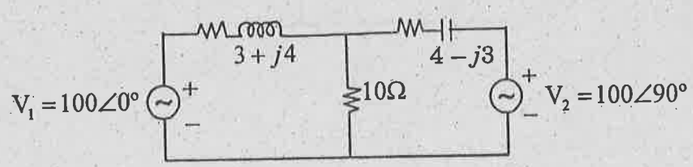
10. Obtain an expression for power in 3-phase system, star connected and also Delta connected.

(5 × 5 = 25 marks)

Part C

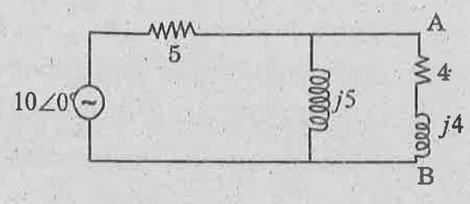
Each full question carries 12 *marks.*

11. Determine the current taken by 10Ω resistor in the circuit.

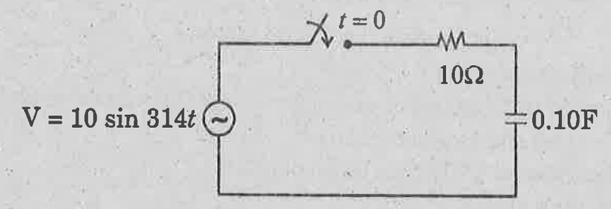


Or

12. In the network shown the 4Ω resistor is changed to 5Ω. Determine the change in current using compensation theorem.

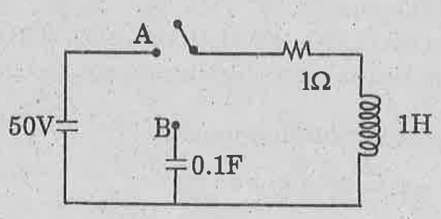


13. Find $v_c(t)$ and $i(t)$ when the switch is closed at $t = 0$ in the network shown.

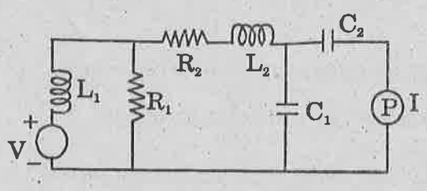


Or

14. In the network shown steady state has been reached with S on position A. It is moved to B at $t = 0$. Determine the current flowing through the inductor.

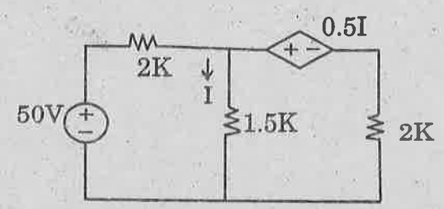


15. Draw the graph, select a free and obtain the tie set matrix.

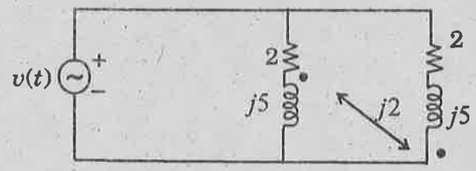


Or

16. For the circuit shown, find the current I and voltage at node 3 using PSPICE program.



17. Find the equivalent input impedance of the network.



Or

18. An impedance function is given by $Z(s) = \dfrac{(s+1)(s+4)}{s(s+2)(s+5)}$. Obtain the RC realization in two different forms.

19. A 3 phase 400V, 4 wire star-connected load has $Z_A = (10 + j0)$ ohms, $Z_B = (15 + j10)$ ohms, $Z_C = (0 + j5)$ ohms. Find the line currents and current through neutral conductor.

Or

20. A system of unbalanced three phase voltages are given by 100V, $j200$ V and $(-100 - j160)$V. Determine the three symmetrical components of the system.

(5 × 12 = 60 marks)

F 3004 **(Pages : 3)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branches : Civil/Mechanical/Electrical and Electronics/Polymer/Electronics and Communication/Applied Electronics and Instrumentation/Instrumentation and Control/ Electronics and Instrumentation/Automobile Engineering/Aeronautical Engineering

ENGINEERING MATHEMATICS—II (CMEPLANSUF)

(Supplementary/Mercy Chance—Old Scheme)

Time : Three Hours Maximum : 100 Marks

Answer any **one** *full question from each module.*
Each full question carries 20 *marks.*

Module 1

1. (a) If $\vec{r} = a\cos t\,\hat{i} + a\sin t\,\hat{j} + at\tan\alpha\,\hat{k}$, find $\left|\frac{d\vec{r}}{dt}\times\frac{d^2\vec{r}}{dt^2}\right|$ and $\left|\frac{d\vec{r}}{dt}\,\frac{d^2\vec{r}}{dt^2}\,\frac{d^3\vec{r}}{dt^3}\right|$.

(b) A particle moves on the curve $x = 2t^2, y = t^2 - 4t, z = 3t - 5$ where t is the time. Find the components of velocity and acceleration at time $t = 1$ in the direction $\hat{i} - 3\hat{j} + 2\hat{k}$.

Or

(c) Find the divergence and curl of the vector $\vec{R} = (x^2 + yz)\hat{i} + (y^2 + zx)\hat{j} + (z^2 + xy)\hat{k}$.

(d) Find the directional derivative of $\nabla\cdot(\nabla\phi)$ at the point (1, –2, 1) in the direction of the normal to the surface $xy^2z = 3x + z^2$, where $\phi = 2x^3y^2z^4$.

Module 2

2. (a) If $\vec{F} = (2x^2 - 3z)\hat{i} - 2xy\,\hat{j} - 4x\,\hat{k}$, then evaluate $\iiint_V \nabla\times\vec{F}\,dV$ where V is the closed region bounded by the planes $x = 0, y = 0, z = 0$ and $2x + 2y + z = 4$.

(b) Verify Stoke's theorem for the vector field $\vec{F} = (x^2 - y^2)\hat{i} + 2xy\,\hat{j}$ integrated round the rectangle in the plane $z = 0$ and bounded by the lines $x = 0, y = 0, x = a, y = b$.

Or

(c) Evaluate $\iint_S (\nabla \times \vec{A}) \cdot \hat{n}\, dS$, where S is the surface of the cone $z = 2 - \sqrt{x^2 + y^2}$ above the xy–plane and $\vec{A} = (x - z)\,\hat{i} + (x^3 + yz)\,\hat{j} - 3xy^2\,\hat{k}$.

(d) Verify divergence theorem for $\vec{F} = 2x^2 y\,\hat{i} - y^2\,\hat{j} + 4xz^2\,\hat{k}$ taken over the region in the first octant bounded by $y^2 + z^2 = 9$ and $x = 2$.

Module 3

3. (a) Determine the analytic function whose real part is $e^{-x}(x \sin y - y \cos y)$.

(b) If $f(z)$ is an analytic function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) \log |f'(z)| = 0$.

(c) Find the image of the circle $|z| = 2$ under the transformation $W = z + 3 + 2i$.

Or

(d) Show that the function $u = e^{-2xy} \sin(x^2 - y^2)$ is harmonic. Find the conjugate function V and express $u + iV$ as an analytic function of z.

(e) Find the bilinear transformation which maps the points $z = 1, i, -1$ into the points $w = i, 0, -i$. Hence find the image of $|z| < 1$.

Module 4

4. (a) Prove that $\Delta \log f(x) = \log\left[1 + \frac{\Delta f(x)}{f(x)}\right]$ interval of differencing is unity.

(b) Evaluate $\left(\frac{\Delta}{E}\right)^2 f(x)$, where h is the interval of differencing.

(c) Use Lagrange's interpolation formula and find the value at $x = 3.5$ with the following data for y :

x :	1	3	5
y :	1.5708	1.5716	1.5736

Or

(d) Prove that $e^x = \left[\frac{\Delta^2}{E}\right] e^x \cdot \frac{E e^x}{\Delta^2 e^x}$, the interval of differencing being unity.

(e) The following table gives the population of a town during the last six censuses. Estimate, using Newton's interpolation formula, the increase in the population during the period from 1996 to 1998.

Year	:	1901	1911	1921	1931	1941	1951
Population (in thousands)	:	22	25	30	40	59	72

Module 5

5. (a) Given the following tabulated values of a function :

x :	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y :	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0520

Prepare a difference table and evaluate y' at $x = 1.2$.

(b) Certain values of x and y are given below :

x :	0	0.25	0.50	0.75	1.0
y :	1	0.9394	0.7788	0.5694	0.3678

Estimate the value of the integral $\int_0^1 y\, dx$, using both the Trapezoidal and Simpson's rule.

Or

(c) Solve the following difference equation :

$y_{n+2} - y_{n+1} + y_n = 0$, given that $y_0 = 1$ and $y_1 = \frac{1 + \sqrt{3}}{2}$.

(d)

x :	0.0	0.1	0.2	0.3	0.4	0.5	0.6
y :	3.013	3.162	3.287	3.364	3.395	3.381	3.324

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 0.3$.

(5 × 20 = 100 marks)

16. Find the Thevenin's equivalent of the network shown in Fig. 9.

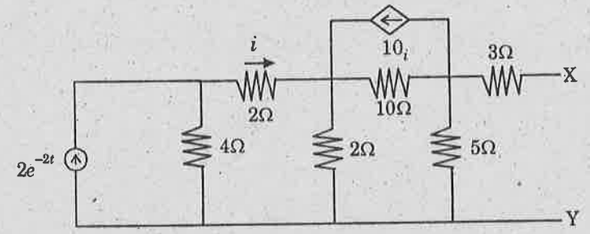


Fig. 9.

MODULE 4

17. A symmetrical three-phase 100 V, three-wire supply feeds an unbalanced star - connected load, with impedances of the load as $Z_R = 5\angle 0°\ \Omega$, $Z_Y = 2\angle 90°\ \Omega$ and $Z_B = 4\angle -90°\ \Omega$. Calculate the (i) line currents, (ii) voltage across the impedances, and (iii) the displacement neutral voltage.

Or

18. A three-phase three-wire unbalanced load is star-connected. The phase voltages of two of the arms are $V_R = 100\angle -10°$, $V_Y = 150\angle 100°$. Calculate the voltage between star point of the load and the supply neutral.

MODULE 5

19.

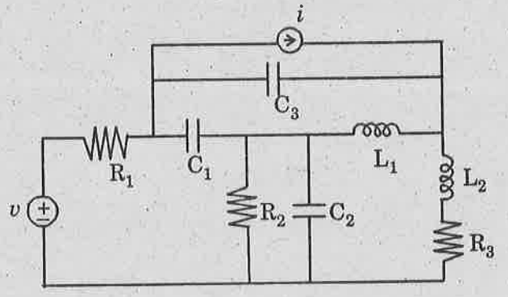


Fig. 10.

Draw the directed graph of the network shown in Fig. 10, choose a tree, write the cut-set matrix, branch admittance matrix and node-pair equations.

Or

20. Describe how MATLAB can be used in the analysis of meshes. Find the values of the current phasors in the following circuit using MATLAB. Write the program.

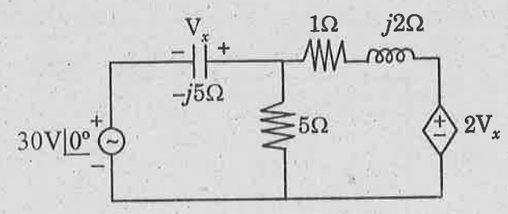


Fig. 11.

(5 × 12 = 60 marks)

F 3017 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

ELECTRIC CIRCUIT THEORY (E)

(Supplementary/Mercy Chance—Old Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Explain mesh analysis of solving an electrical network with suitable example.
2. Write transformed equivalents of inductance and capacitance considering initial conditions.
3. Draw the magnetic coupled circuits and their equivalent circuits for different dot conventions.
4. Calculate the T equivalent of a linear transformer and draw the circuit.
5. State and prove compensation theorem with the help of a suitable example.
6. State and prove Millman's theorem for the 'n' voltage sources in parallel.
7. Three impedances z_1, z_2, and z_3 are connected in delta. From basics obtain the y equivalent. What do you understand by equivalence in the above case ?
8. What do you understand by the terms :
   (a) Polyphase. (b) Unbalanced system.
   (c) Phase sequence. (d) Neutral shift.
9. Explain the concept of duality with the help of suitable example.
10. Write down the augmented incidence matrix for the following :

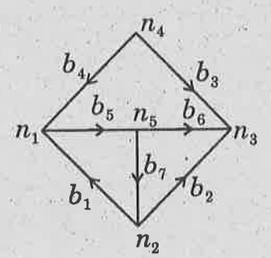


Fig. 1

(10 × 4 = 40 marks)

Turn over

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) Find the driving point admittance of the network shown in Fig. 2.

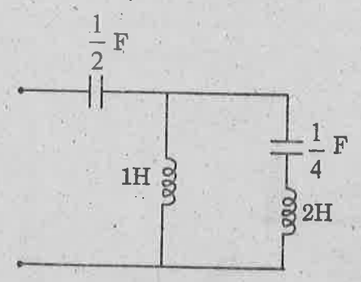


Fig. 2

(b) Obtain the transfer function $\frac{V_2}{V_1}$ of the network shown in Fig 3. Also find $V_2(t)$ when $V_1(t) = 10e^{-2t}$ volt.

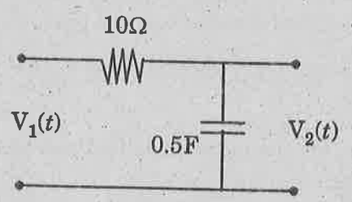


Fig. 3

Or

12. Solve for I shown in the circuit of Fig. 4, by mesh analysis.

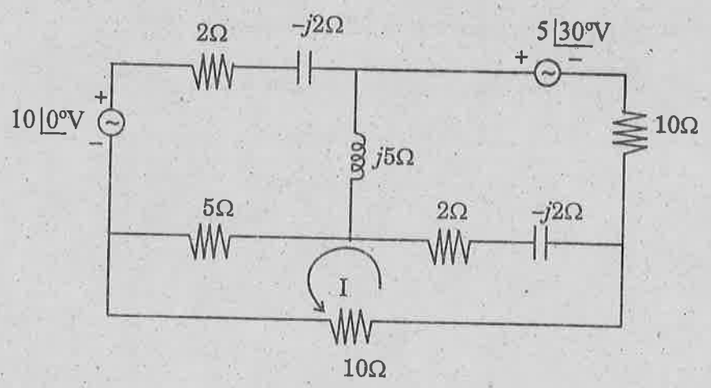


Fig. 4.

MODULE 2

13. (a) Find the voltage across the 5 Ω resistance in the magnetically coupled circuit shown in Fig. 5.

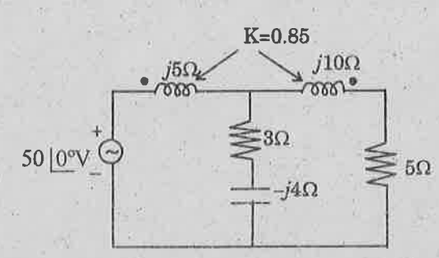


Fig. 5.

(b) A coil of 100 turns is wound uniformly over an insulator ring with a mean circumference of 2 m. and a uniform sectional area of 0.02 cm^2. If the coil is carrying a current of 2A. Calculate (i) the m.m.f. of the circuit, (ii) magnetic field intensity and (iii) the total flux.

Or

14. Calculate the effective inductance of the circuit shown in Fig. 6 across AB.

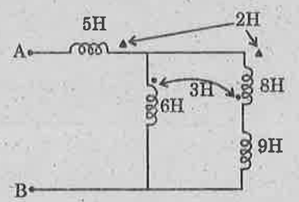


Fig. 6.

MODULE 3

15. (a) For the circuit shown in Fig. 7; the resistance R is changed from 4 Ω to 2 Ω. Verify the compensation theorem.

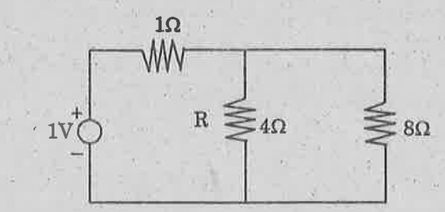


Fig. 7

(b) Use superposition theorem to find the voltage V in the circuit of Fig. 8.

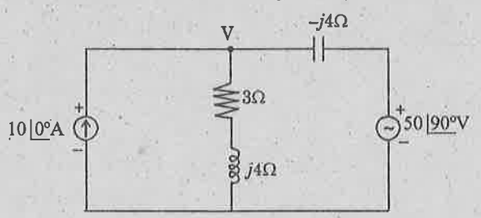


Fig. 8.

Or

F 3026 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

ELECTROMAGNETIC THEORY (E)

(Supplementary, Mercy Chance—Old Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each questions carries 4 *marks.*

1. Distinguish between Cartesian and Cylindrical co-ordinate systems.
2. Explain divergence theorem in electrostatic field.
3. Explain electric Dipole moment.
4. What are equipotential contours ? How they are plotted ?
5. Explain the concept of conduction current density.
6. Describe elliptic polarization.
7. What is magnetic torque and dipole moment ? Explain.
8. Define and explain (a) magnetization and (b) permeability.
9. Show that a quarter wave transmission line acts as an impedance inverter.
10. Show that $\bar{\nabla} \times \bar{H} = -\frac{\partial B}{\partial t}$.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) Find the volume enclosed by the surface defined by the following spherical co-ordinates.
    (i) $5 < t < 2$, $0.1\pi < \theta < 0.4\pi$, $1.2\pi < \phi < 1.8\pi$.
    (ii) $3 < r < 5$, $0.1\pi < \theta < 0.3\pi$, $1.2\pi < \phi < 1.6\pi$.

    (b) Find $\bar{E}$ at points P_1 (3, 8, –3) and P_2 (8, 2, 6) due to a sheet charge 24 n C/m^2 located at $y = 4$ plane.

Or

12. (a) What are field lines ? How they differ from lines of forces ? State and prove the Gauss's law of electrostatics.

(b) A vector field $\bar{D} = \frac{5r^2}{a}\hat{a}_r$ is given in spherical co-ordinates. Evaluate both sides of divergence theorem for the volume enclosed between : (i) $r = 1$ and $r = 2$, (ii) $\theta = 0$ *to* $\pi/4$ and $r = 4$.

Module 2

13. (a) Find the work done in moving a charge of 3C in a uniform electric field $\bar{E} = 10\,\hat{a}_x + 12\,\hat{a}_y + 5\hat{a}_z\ v/m$ between the points (i) (0, 0, 0) to (0, 0, 3) ; (ii) (0, 1, 0) to (4, 0, 3) ; (iii) (2, 0, 5) to (3, 2, 6).

(b) Find the expression for electric field intensity and potential due to electric dipole situated at the origin.

Or

14. (a) What is an equipotential surface ? Find the potential difference between two distant points at r_1 and r_2 from an infinitely long line charge.

(b) If $V = 2x^2y + 20\,z - \frac{4}{x^2 + y^2}$ volt, find $\bar{E}, \bar{D}$ and ρ_v at p (6, –2.5, 3).

Module 3

15. (a) A point charge is located at a distance d in front of a ground infinite conducting plane. Using the method of images derive the expression for the electric field strength at a point induced surface charge density on the conductor.

(b) With neat diagrams and expressions, explain the boundary condition between dielectrics.

Or

16. (a) Obtain the capacitance of an isolated charged spherical conductor.

(b) At the boundary between glass ($\epsilon_r = 4$) and air, the lines of electric field make an angle of 40° with the normal to the boundary. If electric flux density in air is 0.25μ C/m^2, determine the orientation and magnitude of electric flux density in glass.

Module 4

17. (a) State and explain Ampere's law.

(b) Find the magnetic field intensity at the centre of a square of sides equal to 5 m and carrying a current equal to 10 Amperes.

Or

18. (a) A solenoid with air core has 2000 turns and length of 40 cm. Core radius is 40 mm. Find its inductance.

(b) Determine H for a solid cylindrical conductor at a radial distance of 3mm. Given radius of the conductor = 6mm, length = 1m. A current of 1 ampere is uniformly distributed over the cross section.

Module 5

19. (a) Obtain Maxwell's equation in point form for static fields.

(b) Find the displacement current density within a parallel plate capacitor having a dielectric with $\epsilon_r = 10$, area of plates = 0.01m^2, distance of separation = 0.05 mm and the capacitor voltage is 200 sin 200t.

Or

20. (a) Distinguish between conduction current and displacement current.

(b) Calculate the frequency at which conduction current density and displace current density are equal in a medium with $\sigma = 2 \times 10^{-4}$ *s/m* and $\epsilon_r = 81$.

(5 × 12 = 60 marks)

F 3034 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL AND ELECTRONIC MEASUREMENTS (E)

(Supplementary/Mercy Chance—Old Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. What is meant by dimension of an electrical quantity ? Obtain dimensions of resistance.
2. Define the terms "current sensitivity" and "voltage sensitivity" of a galvanometer.
3. Explain the basic principle of a simple wire d.c. potentiometer.
4. What are the factors affecting the earth resistance ?
5. Describe the sources and the null detectors used for a.c. bridges.
6. Draw the circuit arrangement of an Anderson bridge.
7. Define (i) burden ; (ii) nominal transformation ratio ; and (iii) turns ratio of an instrument transformer.
8. What are the basic advantages inherent in the method of using instrument transformers for measurement purposes ?
9. State and explain Lambert's cosine law.
10. What are the porperties of thermoelectric materials ?

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. With neat diagrams describe the construction and working of a ballistic galvanometer. Explain the differences in constructional details of a ballistic galvanometer and a D'Asonval galvanometer.

Or

12. (a) Describe the function of a shunted fluxmeter. Prove that the deflection of a shunted fluxmeter is independent of the resistance of its coil.

    (b) A fluxmeter when used with single turn search coil gives full scale deflection if a given uniform field linking with the search coil is reversed. It is proposed to extend the range of fluxmeter to measure flux densities four times the above value using the same search coil and method of reversals. If the resistance of search coil is 1.1 Ω, find the resistance of shunt to be connected in parallel with the fluxmeter.

Turn over

Module 2

13. (a) Describe with the help of neat diagram, the principle and working of one form of DC potentiometer. Explain how this potentiometer is standardised.

(8 marks)

(b) Explain the principle and applications of self-balancing potentiometer. (4 marks)

Or

14. (a) With necessary equations and diagrams describe the potentiometer method of measuring low resistance.

(8 marks)

(b) Each of the ratio arms of a laboratory type Wheatstone bridge has guaranteed accuracy of ± 0.05 %, while the standard arm has a guaranteed accuracy of ± 0.1 %. The ratio arms are both set at 1000 Ω and bridge is balanced with standard arm adjusted to 3154 Ω. Determine the upper and the lower limits of the unknown resistance, based upon the guaranteed accuracies of the known bridge arms.

(4 marks)

Module 3

15. (a) With neat diagram, explain how inductance is measured using Maxwell's bridge. (6 marks)

(b) A Maxwell's inductance-capacitance bridge is used to measure an unknown inductance in comparison with capacitance. The various values at balance R_2 : (known non-inductive resistance in the arm ad) = 400 Ω. R_3 : (known non-inductive resistance in the arm *bc*) = 600 Ω. R_4 : (known non-inductive resistance in the arm *cd*) = 1000 Ω. C_4 : (variable standard capacitor in the arm *cd*) = 0.5 μF. Calculate the parameters of the coil. Also calculate the value of storage Q factor of coil if frequency is 1000 Hz.

(6 marks)

Or

16. (a) With neat diagram, explain Wien bridge used to measure frequency. Derive the condition for its frequency.

(8 marks)

(b) Determine the equivalent parallel resistance and capacitance that causes a standard Wien bridge to mill with the following component values : R_1 = 2.8 K, R_2 = 20 K, R_4 = 80 K, C_1 = 4.8 μF, f = 2 kHz.

(4 marks)

Module 4

17. Draw the equivalent circuit and phasor diagram of a potential transformer and explain. Derive the expressions for its ratio error and phase angle error.

Or

18. (a) What are "systematic errors" ? Explain the following errors with suitable examples :

(i) Instrumental errors.

(ii) Environmental errors.

(iii) Observational errors.

(6 marks)

(b) The resistance of a circuit is found by measuring current flowing and the power fed into the circuit. Find the limiting error in the measurement of resistance when the limiting errors in the measurement of power and current are 0.9 % and ± 0.6 % respectively. (6 marks)

Module 5

19. (a) Explain the terms :

(i) Luminous flux. (ii) Luminous intensity.

(iii) Illuminance. (iv) Efficacy related to photometry.

(8 marks)

(b) A certain lamp, giving equal illuminance below the horizontal, hangs from the ceiling of a room. The illuminance received on a small horizontal screen lying on a bench vertically below the lamp is 60 lux. When the screen is moved a distance of 1.2 m. along the bench, the illumination is 30.72 lux. Calculate the luminous intensity of the lamp and its vertical distance from the bench.

(4 marks)

Or

20. With the help of neat diagrams, describe the working of thermocouple. What are the properties of materials used ? Describe the construction using different materials with neat sketches.

(5 × 12 = 60 marks)

F 3042 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Third Semester

Branch : Electrical and Electronics Engineering

POWER GENERATION AND DISTRIBUTION – (E)

(Supplementary / Mercy Chance – Old Scheme)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Distinguish between load curve and load duration curve and explain the significance of load curve.
2. Explain how the cost of electrical energy is expressed.
3. Explain briefly a distribution system.
4. Briefly explain the ring main system of distribution. Mention its merits.
5. Explain the method of power factor improvement with suitable vector diagram.
6. Explain the important rules for supplying electrical energy.
7. Explain the general construction of a single core cable.
8. Derive an expression for insulation resistance of a cable.
9. Explain the generation of high voltage D.C. using voltage doubler circuit.
10. Define the front and tail times of an impulse wave. What are the tolerance allowed as per the specifications?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Explain the factors affecting the economics of generation and distribution of power.

    (b) A base load station having a capacity of 18 MW and a standby station having a capacity of 20 MW share a common load. Find the annual load factors and plant capacity factors of power stations from the following data :

Annual standby station output = 7.35×10^6 kWh ; Annual base load station output = 101.35×10^6 kWh ; Peak load on the standby station = 12 MW ; Hours of use of standby station/year = 2190.

(6 + 6 = 12 marks)

Or

(c) What is depreciation ? Explain how depreciation is calculated using diminishing value method.

(d) The monthly electricity consumption of a residence can be approximated as under :

(i) Light load : 6 tube lights 40 watts each working for 4 hours daily.

(ii) Fan load : 6 fans 100 watts each working for 6 hours daily.

(iii) Refrigerator load : 2 kWh daily ;

(iv) Miscellaneous load : 2 kW for 2 hours daily.

Find the monthly bill at the following tariff :

First 20 units Rs. 0.50/kWh ; Next 30 units Rs. 0.40/kWh ; Remaining units Rs. 0.30/kWh, constant charge is Rs. 25.0 per month.

(7 + 5 = 12 marks)

12. (a) Write a note on requirement of a distribution system.

(b) A 2 wire D.C. distributor cable AB is 2.2 km long and supplies loads of 25 A, 50 A, 75 A at 0.4 km, 1 km and 1.6 km from the point A. Each conductor has a resistance of 0.05 ohm/km. Calculate the potential difference at each point if the potential difference of 400 V is maintained at point A.

(5 + 7 = 12 marks)

Or

(c) A 1.5 km long single phase 2-wire feeder supplies the loads as under :

60 A at 0.8 pf (lagging), 600 m from the feed point ; 40 A at 0.85 (lagging), 1200 m from the feed point; 50 A at 0.88 (lagging), 1500 m from the feed point. The resistance and reactance of the feeder per km length (go and return) are 0.12 Ω and 0.2 Ω respectively if the voltage at the far end is to be maintained at 220 V, calculate the voltage of the sending end, and its phase angle with respect to the receiving end voltage.

(12 marks)

13. (a) Kelvin's law does not give the exact economical size of the conductor. Give reasons in support of your answer.

(b) Determine the most economical size of a three-phase line which supplies the following load at 10 kV. (i) 1000 kW at 0.8 pf (lag) for 10 hours, (ii) 500 kW at 0.9 pf (lag) for 8

hours and (iii) 100 kW at UPF for 6 hours (daily load cycle). The cost per km of the completely erected line is Rs. (8000 a+ 1500) where 'a' is the area of X-section of each conductor in cm^2. The combined interest and depreciation is 10 % per annum of capital cost. Cost of energy loss is 5 paise/kWh.

Resistivity of conductor material is = 1.72×10^{-6} Ω-cm

Or

(c) Derive an expression for most economical powerfactor when the kW demand is constant.

(d) Why is low lagging powerfactor undesirable?

(8 + 4 = 12 marks)

14. (a) Derive an expression for electric stress of a single core cable. Where is the stress maximum? Where is it minimum and why?

(b) In a test by Murray loop method for a fault to earth on a 520 m length of cable having a resistance of 1.1 Ω per 1000 metre, the faulty cable is looped with a sound cable of the same length but having a resistance of 2.29 Ω per 1000 metre. The resistances of the other two arms of the testing network, at balance, are in the ratio of 2.7 : 1. Calculate the distance of fault from the testing end of test cable

(7 + 5 = 12 marks)

Or

(c) What is grading of cables? Why it is necessary? Explain the different methods used for grading of cables.

(12 marks)

15. (a) With help of neat diagram explain how high voltage A.C. is generated using cascading of transformers.

(b) A 12 stage impulse generator has 0.126 μ F capacitor. The wave front and the wave tail resistances connected are 800 Ω and 5000 Ω respectively. If the load capacitor is 1000 PF, find the front and tail times of the impulse wave generated?

(7 + 5 = 12 marks)

Or

(c) Briefly explain the basic principle of electrostatic machines.

(d) What is the principle of operation of resonant transformer? How it is advantageous over the cascade connected transformers?

(5 + 7 = 12 marks)

[5 × 12 = 60 marks]