F 3085 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Electrical and Electronics Engineering

MECHANICAL TECHNOLOGY (E)

(Old Scheme—Prior to 2010 Admissions)

(Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is the importance of compressibility in fluid flow ?
2. What are the applications of pressure switches ?
3. List the different forces present in a fluid flow.
4. Differentiate between isentropic and adiabatic process.
5. Define the term "governing of a turbine".
6. What is meant by the speed ratio of a pelton wheel ?
7. What do you mean by static discharge head of a centrifugal pump ?
8. State the significance of similarity parameters in hydraulic pumps.
9. What are the advantages of using root pumps ?
10. Why is the speed of a reciprocating pump without air vessel not high ?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 marks.

11. Derive the relationship between Bulk modulus (K) and pressure (P) for a gas for (i) isothermal process and (ii) adiabatic process.

Or

12. With neat sketches, explain the working of (i) single column manometer and (ii) U-tube manometer.

Turn over

13. A pipe of diameter 30 cm carries water at a velocity of 20 m/sec. The pressures at points A and B are given as 34.335 N/cm^2 and 29.43 N/cm^2 respectively, while the datum head at and B are 25 m and 28 m. Find the loss of head between A and B.

Or

14. What is a venturimeter ? Derive an expression for the discharge through a venturimeter.

15. A water turbine has a velocity of 6 m./s at the entrance to the draft tube and a velocity of 1.2 m/s at the exit. For friction losses of 0.1 m and a tail water 5 m below the entrance to the draft tube, find the pressure head at the entrance.

Or

16. A turbine develops 7357.5 kW S.P. when running at 200 r.p.m. The head on the turbine is 40 m. If the head on the turbine is reduced to 25 m. determine the speed and power developed by the turbine.

17. Discuss the principles of working, efficiency, performance curves and applications of (i) jet pump and (ii) air lift pump.

Or

18. Find the number of pumps required to take water from a deep well under a total head of 156 m. Also the pumps are identical and are running at 1000 r.p.m. The specific speed of each pump is given as 20, while the rated capacity of each pump is 150 litres/s.

19. What is an indicator diagram ? Discuss the effect of acceleration and friction in suction and delivery pipes on the indicator diagram.

Or

20. A single acting reciprocating pump has a stroke length of 15 cm. The suction pipe is 7 m long and the ratio of suction diameter to plunger diameter is 3/4. The water level in the sump is 2.5 m below the axis of pump cylinder, and the pipe connecting the sump and pump cylinder is 7.5 cm diameter. If the crank is running at 75 r.p.m., determine the pressure head on piston in the middle of the suction stroke.

(5 × 12 = 60 marks)

F 3127 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Common to all Branches

EN 010 302—ECONOMICS AND COMMUNICATION SKILLS (AI, AN, AU, CE, CH, CS, EC, EE, EI, IC, IT, ME, MT, PE, PO, ST)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the objectives of credit control ?
2. What is WTO ? What are its objectives ?
3. State the merits of indirect taxes.
4. List the different types of inflation.
5. Distinguish between free trade and protection.

(5 × 3 = 15 marks)

Part B

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

6. What is meant by credit creation ? What are the tendencies behind credit creation ?
7. Render your comments on the disinvestment of public sector undertakings.
8. What are the differences between a tax on income and tax on a commodity ? Why is a tax on income preferred in modern times ?
9. What are the major methods of measuring national income ? Explain.
10. State and explain the various items included in the balance of payments of a country.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. What are the main functions of banks ? Explain the role played by Commercial banks in the economic development of a country.

Or

12. "Stock market can be regarded as an economic barometer." Critically examine this statement in the context of Indian economy.

13. What are the measures taken by Indian Government in the case of Globalisation, Liberalisation and Privatisation. Explain their impacts on Indian economy.

Or

14. Discuss the past, present and future prospects of Information Technology industries on Indian economy.

15. (a) Distinguish between Forward and Backward shifting of tax. Explain the impact and incidence of tax. (7 marks)

(b) Explain progressive, proportional and regressive taxes with suitable examples. (5 marks)

Or

16. (a) Explain the important problems associated with deficit financing in Indian Economy. (7 marks)

(b) Define tax evasion. Explain the reasons for the same in India. (5 marks)

17. (a) Define National Income. What are its concepts ? Explain the difficulties arising in the calculation of National Income. (7 marks)

(b) Explain the significance of national income statistics. (5 marks)

Or

18. Describe the different types of inflation and their causes. What are the steps taken by the Government to control the same ? Explain.

19. What are the different types of disequilibrium in BOP ? Explain the causes for and the methods of correcting disequilibrium in BOP.

Or

20. What are the main causes of India's adverse balance of payments ? Explain the measures that have been adopted to correct the adverse balance of payments. Critically examine India's trade policy.

[5 × 12 = 60 marks]

F 3142 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Electrical and Electronics Engineering

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

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. State and briefly explain the classification of electrical measuring instruments.
2. What is the condition to get maximum sensitivity for a Wheatstone bridge ?
3. Explain the sources of errors in single-phase induction type energy meter.
4. Draw the circuit diagram to show how a d.c. potentiometer can be used for calibration of a voltmeter.
5. What are permeameters ? List any two types.

(5 × 3 = 15 marks)

Part B

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

6. A moving coil instrument gives a full scale deflection of 10 mA. When the potential difference across its terminals is 100 mV, calculate :
   (i) The shunt resistance for a full scale deflection corresponding to 100 A.
   (ii) The series resistance for full scale reading with 1000 V.
7. Explain the working of Crompton's d.c. potentiometer with a neat diagram.
8. What are the errors in dynamometer type wattmeter ?
9. Derive expressions for the ratio and phase angle errors of a current transformer.
10. Explain the working of a flux meter.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Explain underdamping, critical damping and overdamping in indicating instruments. The best operating conditions are obtained with the meter that is either critically damped or slightly underdamped. Why ?

Or

12. (a) With a neat diagram, explain hot wire ammeter (thermal). What are its limitations ? (7 marks)

(b) Describe with neat figures the working of air friction damping devices. (5 marks)

13. With neat diagrams, describe how Wien bridge can be used for the measurement of frequency. Derive the condition for its resonance.

Or

14. (a) What are the problems associated with an a.c. potentiometer ? Explain with neat diagram, any one a.c. potentiometer. (6 marks)

(b) Using neat circuit diagram, describe how will you calibrate a d.c. ammeter with the help of a direct reading d.c. potentiometer. (6 marks)

15. With a neat block diagram, explain the working of electronic energy meter. What are its merits compared to the induction type energy meter.

Or

16. Explain the construction and operation of M.I. type power factor meter.

17. A current transformer has a single turn primary and has 200 turns secondary winding. The secondary supplies a current of 5A to a non-inductive burden of 1 Ω resistance. The requisite flux is set up in the core by 80 amp-turns in the primary winding. The frequency is 50 Hz and the cross-sectional area of the core is 10 $cm.^2$ and the stacking factor 0.9. Calculate the (i) ratio and phase angle errors of the C.T. ; (ii) the flux density in the core. Neglect the effects of magnetic leakage and iron and copper losses.

Or

18. Derive the expressions for the actual transformation (voltage) ratio and phase angle in the case of a potential transformer.

19. With a neat block diagram, explain the working of a digital storage oscilloscope.

Or

20. With a block diagram, describe the working of an electronic voltmeter. How autoranging is effected ?

(5 × 12 = 60 marks)

F 3161 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Electrical and Electronics Engineering

EE 010 306—MECHANICAL TECHNOLOGY (EE)

(2010 Admission onwards—New Scheme)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Differentiate between Newtonian and Non-Newtonian fluids.
2. Differentiate between Eulerian and Lagrangian approaches of fluid flow.
3. Give a comparison between Pelton wheel and Francis turbines.
4. Define specific speed of a centrifugal pump.
5. Define the term "Net positive suction head".

(5 × 3 = 15 marks)

Part B

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

6. Briefly explain the importance of viscosity in fluid motion.
7. List the assumptions made in the derivation of Bernoullis equation.
8. How can cavitation be avoided in reaction turbine ?
9. Briefly discuss the working of an airlift pump.
10. Discuss the applications of positive displacement pumps.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Define and explain Pascal's law. What are the applications of this law ?

Or

Turn over

12. With neat sketch, explain the analytical method for determining meta-centric height of a floating body ?

13. Describe with the help of sketch the construction, operation and use of a Pitot tube.

Or

14. Derive an expression for loss of head due to friction in pipes. How will you determine friction factors for laminar and turbulent flow ?

15. What are the uses of a draft tube ? Describe with neat sketches different types of draft tubes.

Or

16. What is specific speed of a turbine ? Derive expressions and state its significance in the study of hydraulic machines.

17. Draw and explain the significance of : main, operating and ISO efficiency characteristic curves of a centrifugal pump.

Or

18. Discuss the following, with neat sketches :

    (a) Hydraulic balancing.

    (b) Wear rings.

    (c) Priming.

19. What are rotary axial and rotary radial piston pumps ? What are their applications ?

Or

20. Differentiate between :

    (a) Single acting and double acting reciprocating pump.

    (b) Single cylinder and double cylinder reciprocating pump.

    (c) Gear pump and vane pump.

(5 × 12 = 60 marks)

F 3133 (Pages : 6) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Electrical and Electronics Engineering

EE 010 303—ELECTRIC CIRCUIT THEORY (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours **Maximum : 100 Marks**

Part A

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

1. Explain the differences between dependent and independent sources.
2. The natural frequencies of a linear time invariant network are given by $s_1 = -2 + j3$ and $s_2 = -2 - j3$. Give expressions for step response.
3. Define the following with reference to network topology :
   (a) Tree. (b) Branch.
   (c) Oriented graph.
4. List the properties of Hurwitz polynomial.
5. A 3-wire, 3-phase supply feeds a load consisting of 3 equal resistors. By how much is the load reduced if one of the resistors is removed, if the load is star connected.

(5 × 3 = 15 marks)

Part B

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

6. Calculate the open circuit voltage v_{oc} in the circuit shown in Fig. 1.

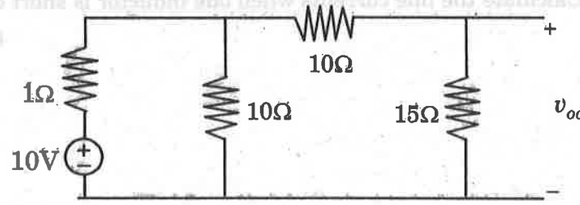


Fig. 1

Turn over

7. An RL circuit has R = 2Ω and L = 4H. Find the time required for the inductor current to reach 50 % of its steady state value.

8. For the network graph shown in Fig. 2, select a tree T (1, 2, 3, 4) and write the basic cut-set matrix.

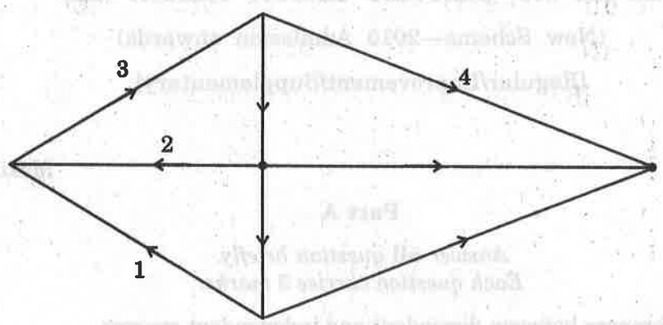


Fig. 2

9. Find V_o in the circuit in Fig.3

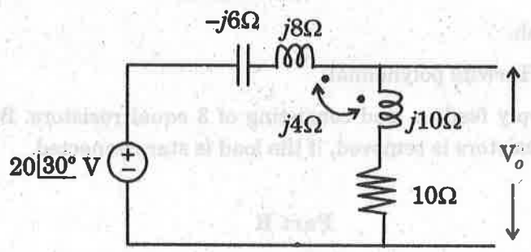


Fig. 3

10. Three equal star-connected inductors take 8 kW at power factor 0.8 when connected to a 415 V, 3-phase, 3 wire supply. Calculate the line currents when one inductor is short circuited.

(5 × 5 = 25 marks)

19. Three impedances $Z_A = 20 \angle 30° \Omega$, $Z_B = 20 \angle -30° \Omega$ and $Z_C = 20 \angle 60° \Omega$ are connected in Y across a 400 V, 3 phase, 3 wire, ACB sequence symmetrical sources. Find :

(i) The potential of star point of load with respect to supply neutral.

(ii) The load phase voltage.

(iii) Current in the lines.

(iv) Total real, reactive and apparent powers.

(v) The balanced delta connected resistors that would take the same real power as the above load from the same source.

Or

20. (a) In a 3-phase symmetrical system, phase sequence RYB, capacitive reactance $X_C = 10\Omega$ is across YB and a coil $R + jX$ across RY. Find R and X such that $I_Y = 0$.

(b) The circuit in Fig. 11 shows an infinite impedance (open circuit) in phase B of the star-connected load. Find the phasor voltage V_{OB} if the system is 208 volt, sequence ABC.

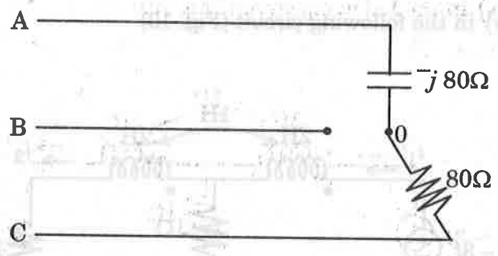


Fig. 11

(5 × 12 = 60 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Find the current through the 1 Ω resistor in Fig. 4 using Millman's theorem.

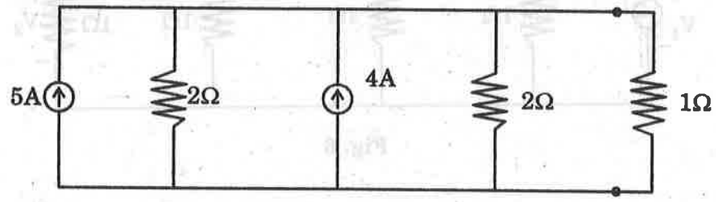


Fig. 4

(6 marks)

(b) Check the validity of Tellegen's theorem provided $V_1 = 8V$, $V_2 = 4V$, $V_4 = 2V$, $I_1 = 4A$, $I_2 = 2A$ and $I_3 = 1A$ in Fig. 5

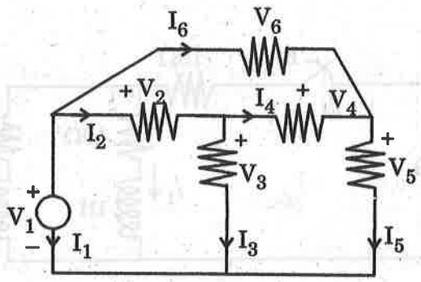
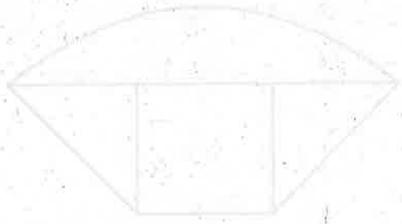


Fig. 5

Or

(6 marks)



12. For the network shown in Fig. 6 determine the numerical values of (a) voltage transfer function (ii) driving point impedance.

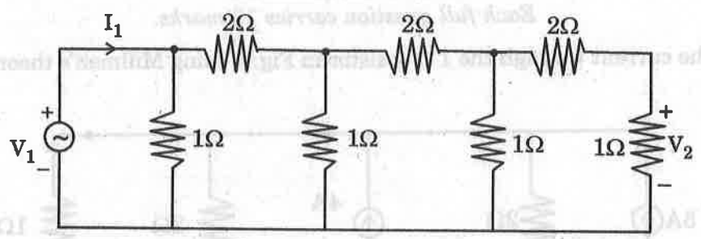


Fig. 6

13. With $V_s = 10$ volt, R = 10 Ω, L = 1H and C = 1 μF, $V_c(0^-) = 0$, find $i(0^+)$, $\frac{di}{dt}(0^+)$ and $\frac{d^2i}{dt^2}(0^+)$ for the series RLC circuit connected to the d.c. voltage at $t = 0$, where $i(t)$ is the current in the circuit.

Or

14. In the circuit shown in Fig 7, the switch K is closed at $t = 0$ with network previously unenergized. For the network element values shown in Fig. 7, find $i_1(t)$ and $i_2(t)$. Use Laplace Transform method.

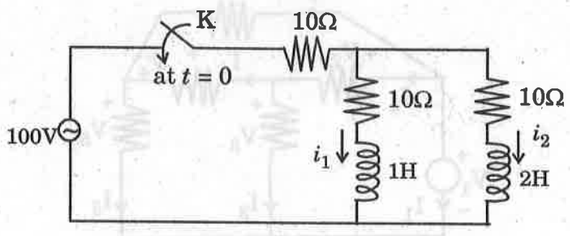


Fig. 7

15. For the network graph shown in Fig. 8, select a suitable tree and obtain the tie-set matrix. Hence write the Kirchoff's voltage law equations

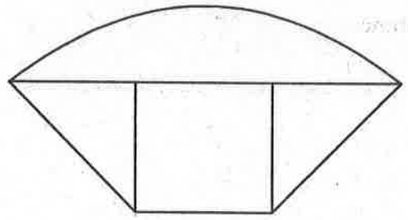


Fig. 8

Or

16. Find v_1, v_2 and v_3 by node analysis, using MATAB program, for the network shown in Fig. 9.

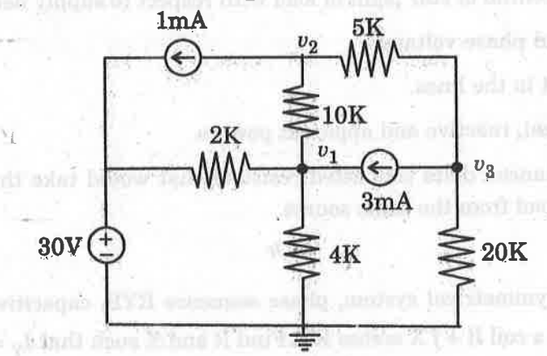


Fig. 9

17. Find $I_1(s)$ and $I_2(s)$ in the following circuit (Fig. 10)

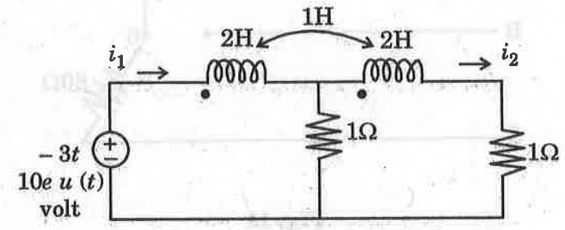


Fig. 10

Or

18. (a) Test whether $s^5 + 3s^4 + 3s^3 + 4s^2 + s + 1$ is Hurwitz or not. (6 marks)

(b) Synthesise the admittance function $Y(s) = \frac{4s^2 + 6s}{s + 1}$. (6 marks)

Turn over

19. (a) Using $z(n) = \frac{z}{(z-1)^2}$, show that $z(n \cos n\theta) = \frac{(z^3+z)\cos\theta - 2z^2}{(z^2 - 2z\cos\theta + 1)^2}$.

(b) Using convolution theorem, find the inverse z-transform of $\frac{8z^2}{(2z-1)(4z-1)}$.

Or

20. (a) Solve the following using z-transforms :

$$y(n) - y(n-1) = u(n) + u(n-1).$$

(b) Given $z(u_n) = \frac{2z^2+3z+4}{(z-3)^3}, |z| > 3$, show that $u_1 = 2, u_2 = 21, u_3 = 139$.

(5 × 12 = 60 marks)

F 3125 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

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, PO, MT, CH AND ST)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary/ST—Regular]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Find grad ϕ if $\phi = \log(x^2 + y^2 + z^2)$.

2. If $\vec{f}(t) = t\,\hat{i} + (t^2 - 2t)\,\hat{j} + (3t^2 + 4t^3)\,\hat{k}$, find $\int_0^1 \vec{f}(t)\,dt$.

3. Evaluate $\Delta^2 E^3 x^2$.

4. Solve $(E^2 + 6E + 9)\ y_n = 0$.

5. Find the z-transform of $3^n \sin\frac{n\pi}{2}$.

(5 × 3 = 15 marks)

Part B

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

6. The position vector of a particle at time t is $\vec{r} = \cos(t-1)\,\hat{i} + \sinh(t-1)\,\hat{j} + \alpha r^3\,\hat{k}$. Find the condition imposed on α by requiring that at time $t = 1$, the acceleration is normal to the position vector.

7. Find the work done when a force $\vec{F} = \left(x^2 - y^2 + x\right)\hat{i} - (2xy + y)\,\hat{j}$ moves a particle in the xy plane from $(0, 0)$ to $(1, 1)$ along the parabola $y^2 = x$.

8. Prove that $\delta = \Delta\ (1 + \Delta)^{-1/2} = \nabla\,(1 - \nabla)^{-1/2}$.

9. Solve the difference equation $y_{n+2} + 3y_{n+1} + 2y_n = \sin\dfrac{n\pi}{2}$.

10. Find the inverse z-transform of $\dfrac{4 - 8z^{-1} + 6z^{-2}}{\left(1 + z^{-1}\right)\left(1 - 2z^{-1}\right)}$.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) The temperature at a point (x, y, z) in space is given $T(x, y, z) = x^2 + y^2 - z$. A mosquito located at $(1, 1, 2)$ desires to fly in such a direction that it will get warm as soon as possible. In what direction should it fly ?

(b) Find the constants a, b, c, so that $\vec{F} = (x + 2y + az)\,\hat{i} + (bx - 3y - z)\,\hat{j} + (4x + cy + 2z)\,\hat{k}$ is irrotational.

Or

12. (a) A particle moves along the curve $\vec{r}\left(r^3 - 4t\right)\hat{i} + \left(t^2 + 4t\right)\hat{j} + \left(8t^2 - 3t^3\right)\hat{k}$ where t is the time. Find the magnitudes of acceleration along the tangent and normal at time $t = 2$.

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

13. (a) Evaluate the line integrals $\int_C \left\{\left(x^2 + xy\right)dx + \left(x^2 + y^2\right)dy\right\}$ where C is the square formed by the lines $y = \pm 1$ and $x = \pm 1$.

(b) Find the circulation of $\vec{F}$ round the curve C, where $\vec{F} = e^x \sin(y)\,\hat{i} + e^x \cos(y)\,\hat{j}$. C is the rectangle whose vertices are (0, 0), (1, 0), $\left(1, \dfrac{\pi}{2}\right)$ and $\left(0, \pi/2\right)$.

Or

14. Apply stoke's theorem to evaluate $\int_C \left[(x + y)\,dx + (2x - z)\,dy + (y + z)\,dz\right]$ where C is the boundary of the triangle with vertices (2, 0, 0), (0, 3, 0) and (0, 0, 6).

15. Find the interpolation the missing values in the following data :

x	:	0	5	10	15	20	25
y	:	6	10	–	17	–	31

Or

16. Use Newton's divided difference formula to find $f(7)$, if $f(3) = 24$, $f(5) = 120$, $f(8) = 502$, $f(9) = 720$, $f(12) = 1616$.

Or

17. Apply Simpson's rule to find the are a abounded by the x-axis, the lines $x = 1$, $x = 4$ and the curve through the points.

x	:	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	:	2.0	2.4	2.7	2.8	3.0	2.6	2.1

Or

18. Find the complete solution for the following :

(a) $y_{n+2} - 4y_{n+1} + 4y_n = 3n + 2^n$.

(b) $u_{x+2} - 2m\,u_{x+1} + \left(m^2 + n^2\right)u_x = m^x$.

F 3103 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch—Electrical and Electronics Engineering

ELECTROMAGNETIC THEORY (E)

(Prior to 2010 Admissions—Old Scheme)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Show how a point P is represented in a spherical co-ordinate system ?
2. State the various types of charge distributions, giving one example of each.
3. What is divergence ? State expressions for divergence in various co-ordinate system.
4. Define an electric dipole. State expression of $\bar{E}$ due to an electric dipole.
5. Derive an equation for the capacitance per metre length of two long parallel conductors with radius R separated by distance *d* in air.
6. Explain the concept of field polarization in dielectrics.
7. Explain the concept of steady magnetic field and conduction current.
8. A charged particle passes through a magnetic field without experiencing any force. What can you conclude about the magnetic field ?
9. Explain how Faraday's law can be used to extend one of the Maxwell's equations from static to time-varying electromagnetic fields.
10. If H = 5.5 mA/m in a medium with $\epsilon_r = 3.3$ and $\mu = \mu_0$ at 300 MHz, calculate the average Poynting vector.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Given the vector field $\bar{W} = 2x^2y\,\bar{a}_x - 2(z - x)\,\bar{a}_y + 3xyz\,\bar{a}_z$. Find (i) $\bar{W}$ at P (2, – 3, 4) ; (ii) Unit vector in the direction of $\bar{W}$ at *p* ; (iii)The equation of surface on which the $\bar{W} = 100$; and (iv) the *y*-co-ordinate of Q (– 3, *y*, 5) such that $|\bar{W}$ at Q $| = 100$ and $y > 0$.

Turn over

(b) Find the electric field intensity at a point (0, 0, 5) meter due to two charges $Q_1 = 0.35\ \mu C$ at (0, 4, 0) and $Q_2 = -0.55\ \mu C$ at (3, 0, 0).

Or

12. (a) A uniform line charge of 20 nc/m is located at $y = 3$, $z = 6$ in free space. Find $\bar{E}$ at :

(i) (2, – 1, 4) meter ; (ii)at the point in $z = 0$ plane where the direction of $\bar{E}$ is $0.33\ \bar{a}_y - 0.66\ \bar{a}_z$.

(b) A dipole of moment $\bar{p} = 6\ \hat{a}_z\ \mu c/m$ is located at the origin in free space. Find electric field intensity $\bar{E}$ at (4, 20°, 0°).

13. (a) Verify that the expression for the potential due to an electric dipole satisfies the Laplace equation.

(b) Determine the electric field intensity of an infinitely long, straight, line charge of a uniform density λ in air.

Or

14. (a) Derive Laplace's and Poisson's equations in relation with electrostatic field.

(b) Given the potential field $V = 50x^2yz + 20y^2$ volts in free space. Find : (i) V at P (1, 2, 3) ; and (ii) E_p.

15. (a) Explain the condition at boundary between two dielectrics.

(b) A parallel plate capacitor of 12 cm × 12 cm and $d = 1$ cm is charged to a potential of 1 kV with air as dielectric. Find the energy stored.

Or

16. Derive the expression for capacitance of a coaxial cable using Laplace's equation.

17. (a) Calculate the force per unit length between two parallel infinite conductors carrying current I Amp ; (i) in the same direction ; and (ii) in the opposite direction.

(b) Calculate the inductance of a solenoid, if the radius is 5 cm, length is 40 cm, N = 500, $\mu_r = 1000$ and I = 10A.

Or

18. (a) State and explain Ampere's circuital law.

(b) Two narrow circular coils A and B having a common axis, are placed 10 cm apart. Coil A has 10 turns of radius 5 cm with a current of 1.0 A passing through it. If the magnetic field at the centre of the coil A to be zero, what current should be passed through the coil B, if coil B has single turn with radius 7.5 cm ?

19. (a) Starting from Maxwell's equations, derive an expression for wave equation in $\bar{H}$ for uniform plane waves in a conducting medium for sinusoidal time variations of the fields.

(b) Write the phasor form of a uniform plane wave having a frequency of 1 GHz that is travelling in the $+x$ direction in a medium of $\epsilon = 12\ \epsilon_0$ and $\mu = \mu_0$.

Or

20. (a) Explain the significance of Poynting vector theorem. Obtain complex Poynting vector theorem.

(b) Explain the concept of uniform plane wave.

(5 × 12 = 60 marks)

F 3119 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Electrical and Electronics Engineering

POWER GENERATION AND DISTRIBUTION (E)

(Prior to 2010 Admissions—Old Scheme)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain the differences in the operations of peak load and base load stations.
2. Briefly explain the general expression for cost of electrical energy.
3. Define the terms feeder and distributor.
4. What is LT capacitor ? Explain its size selection.
5. State Kelvin's law. Explain its significance.
6. What is the importance of power factor in the supply system ?
7. Derive an expression for insulation resistance of a cable.
8. Briefly explain the Varley loop test for locating earth fault in UG cables.
9. Explain the generation of high voltage DC using voltage doubler circuit.
10. Explain the cascade connection of transformer for producing very high a.c. voltage.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) With suitable example clearly explain plant capacity factor and plant use factor. (6 marks)

    (b) A generating station supplies the following loads 15000 kW, 12000 kW, 8500 kW, 6000 kW and 450 kW. The station has a maximum demand of 22000 kW. The annual load factor of the station is 48%. Calculate (i) number of units supplied annually ; (ii) the diversity factor and (iii) the demand factor.

(6 marks)

Or

(c) What is tariff ? Briefly explain the different types of tariff. (12 marks)

12. (a) With help of neat sketches, explain the different connection schemes of distribution systems. (12 marks)

Or

(b) A single-phase A.C distributor AB is fed from end A and has a total resistance of $(0.2 + j\,0.3)\ \Omega$. At the far end, the voltage $V_B = 240$ V and the current is 100 A at a p.f. of 0.8 lagging. At the midpoint M, a current of 100 A is tapped at a p.f. of 0.6 lagging with reference to the voltage V_M at the midpoint. Calculate the supply voltage V_A and phase angle between V_A and V_B. (12 marks)

13. (a) List the important rules regarding the generation of electrical energy. (6 marks)

(b) A two conductor cable, one km in length, is required to supply a constant load of 200 A throughout the year. The cost is Rs. (50a + 25)/m where, 'a' is the area of the conductor in cm^2. Determine the most economical cross section of the conductor if the cost of the energy is 5 paise/kWh and interest and depreciation charges amount to 10%. Specific resistivity of the conductor is 1.85 μΩ-cm. (6 marks)

Or

(c) What is most economical power factor ? Derive an expression for most economical power factor with constant kW demand. (12 marks)

14. (a) Write a short note on insulating materials used for cables. (5 marks)

(b) A single core cable for use on 11kV, 50 Hz system has conductor area of 0.645 cm^2 and internal diameter of sheath is 2.18 cm. The permittivity of the dielectric used in the cable is 3.5. Find : (i) the maximum electrostatic stress in the cable ; (ii) minimum electrostatic stress in the cable ; (iii) capacitance of the cable per km length ; (iv) charging current. (7 marks)

Or

(c) What is the purpose of grading of cable ? Briefly explain the inter sheath grading of cable. (12 marks)

15. (a) With help of neat sketches, describe the working of a Van de Graaff generator. What are the factors that limit the maximum voltage obtained ? (12 marks)

Or

(b) Explain the principle of operation of a resonant transformer. How it is advantageous over the cascade connected transformers ? 7 marks)

(c) A 12 stage impulse generator has 0.15 μF capacitors. The wave front and wave tail resistances connected are 1200 ohms and 6000 ohms respectively. If the load capacitor is 1200 μF, find the front and tail times of the impulse wave produced. (5 marks)

[5 × 12 = 60 marks]

18. With neat circuit diagram, explain how a BJT-crystal oscillator can produce highly stabilised frequency of oscillations ? Design your circuit for generating 3 MHz sine waves.

19. Compare Miller and Bootstrap sweep oscillators using BJT with the description of their circuit diagrams and operation.

Or

20. Design the circuit of an Astable multivibrator using BJT to generate 100 Hz square wave of 0 to 8 volt, 85 % duty cycle. Sketch the important waveforms.

(5 × 12 = 60 marks)

F 3152 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Electrical and Electronics Engineering

EE 010 305—ELECTRONIC CIRCUITS (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw the Drain characteristics of a JFET and indicate the pinch-off points.
2. Calculate the lower cut-off frequency of two-stage RC coupled amplifier if each stage has the lower cut-off of 50 Hz.
3. List the different types of distortions in Power amplifiers.
4. List the different types of negative feedback amplifiers.
5. List one application each of the three types of multivibrators.

(5 × 3 = 15 marks)

Part B

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

6. Draw the emitter characteristics of UJT and explain how negative resistance is obtained ?
7. With sketches, indicate how h_{ie} and h_{re} can be determined from the characteristics ?
8. Sketch the current transfer characteristics of BJT and show how the Q-point varies in the case of class A, B, AB and C power amplifiers.
9. State and explain how Barkhausen criteria and satisfied in the case of Hartley oscillator ?
10. With circuit diagram and waveforms, explain how sweep can be generated in a UJT relaxation oscillator circuit ?

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Draw the diode clipping circuit, which passes voltages between + 3V to +8 Volt only. Design your circuit.

(b) With a circuit diagram, explain the self biased FET amplifier ?

Or

12. Draw the circuit diagram of : (a) Base bias. (b) Collector-to-base feeback bias ; and (c) Potential divider bias circuits and comment on the current stability factors of the three circuits.

13. The *h*-parameters of the transistor in the following circuit (fig. 1), are $h_{ie} = 2K$, $h_{re} = 5 \times 10^{-4}$, $h_{fe} = 100$, $h_{oe} = 80\ \mu s$. If I_o is $1mA_{rms}$, estimate the voltage and current gains of the amplifier.

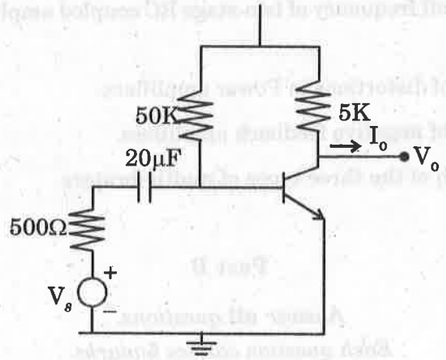


Fig. 1

Or

14 (a) Draw the circuit of a 2-stage RC-coupled amplifier and explain its working and advantages. (9 marks)

(b) Explain the effect of a coupling capacitor in a two-stage RC-coupled amplifier ? (3 marks)

15. For the circuit shown in fig. 2 find the input power, output power and efficiency, if the input voltage, causes a base current 5 mA r.m.s.

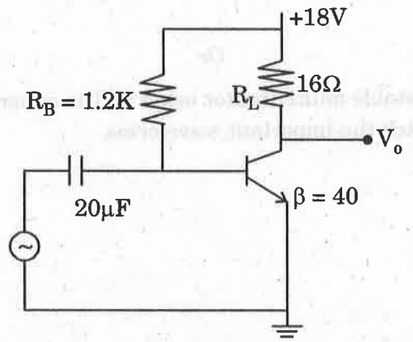


Fig. 2

Or

16. Draw the circuit of a single tuned transformer coupled amplifier and explain its working with the help of frequency response ? How the Q of the circuit is determined ?

17. For the feedback amplifier circuit shown in fig. 3, calculate A_{vf} and R_{if}

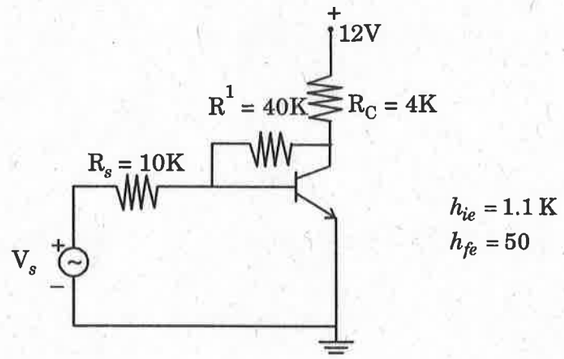


Fig. 3

Or

10. (a) From the following data :

x	:	0.00	0.05	0.10	0.15	0.20	0.25
y	:	0.00000	0.10018	0.20132	0.30458	0.41075	0.52110

Evaluate $\frac{dy}{dx}$ at $x = 1.00$.

(b) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$ and $x = 1.6$.

x	:	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	:	7.989	8.413	8.782	9.129	9.452	9.750	10.022

(5 × 20 = 100 marks)

F 3081 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Common to all Branches except Computer Science and Information Technology

ENGINEERING MATHEMATICS—II (CMEPLANSUF)

(Old Scheme—Prior to 2010 admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

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

Module 1

1. (a) Verify the formula, $\frac{d}{dt}\left(\vec{A}\cdot\vec{B}\right) = \vec{A}\cdot\frac{d\vec{B}}{dt} + \frac{d\vec{A}}{dt}\cdot\vec{B}$ for $\vec{A} = 5t^2\hat{i} + t\,\hat{j} - t^3\hat{K}, \vec{B} = \sin t\,\hat{i} - \cos t\,\hat{j}$.

(b) A particle (position vector $\vec{r}$) is moving in a circle with constant angular velocity w. Show by vector methods, that the acceleration is equal to $-w^2\vec{r}$.

(c) If $u = x^2 + y^2 + z^2$ and $\vec{V} = x\,\hat{i} + y\,\hat{j} + z\,\hat{k}$, show that $\text{div}\left(u\vec{V}\right) = 5u$.

Or

2. (a) If $u = x + y + z$, $v = x^2 + y^2 + z^2$, $w = yz + zx + xy$, prove that :

$(\text{grad}\,u)\cdot\left[(\text{grad}(V))\times(\text{grad}(w))\right] = 0$.

(b) Show that the vector field $\vec{A}$, where $\vec{A} = \left(x^2 - y^2 + x\right)i - (2xy + y)\,\hat{j}$ is irrotational, and find the scalar ϕ such that $A = \text{grad}\,\phi$.

Module 2

3. (a) Find the work done in moving a particle once round the circle $x^2 + y^2 = 9$ in the x-y-plane if the field of force is $\vec{F} = (2x - y - z)\,\hat{i} + \left(x + y - z^2\right)\hat{j} + (3x - 2y + 4z)\,\hat{k}$.

(b) Show that $\iint_S \vec{F}\cdot\hat{n}\,dS = \frac{3}{2}$, where $\vec{F} = 4xz\,\hat{i} - y^2\hat{j} + yz\,\hat{k}$ and S is the surface of the cube bounded by the planes $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.

(c) Use divergence theorem to show that $\oint_C r^n\vec{r}\cdot d\vec{S} = (n+3) = \int_V r^n dV (n \neq -3)$.

Or

4. (a) If S is any closed surface enclosing a volume V and $\vec{F} = x\,\hat{i} + 2y\,\hat{j} + 3z\,\hat{k}$, prove that

$$\iint_S \vec{F}\cdot\vec{n}\,dS = 6V$$

(b) Verify Stoke's theorem for the function $\vec{F} = x^2\,\hat{i} + xy\,\hat{j}$ integrated round the square whose sides are $x = 0, y = 0, x = a$ and $y = a$ in the plane $z = 0$.

(c) The acceleration of a particle at any time t is given by $\vec{a} = 12\cos 2t\,\hat{i} - 8\sin 2t\,\hat{j} + 16t\,\hat{k}$. If the velocity $\vec{v}$ and displacement $\vec{r}$ are zero at $t = 0$, find $\vec{v}$ and $\vec{r}$ at any time t.

Module 3

5. (a) If z_0 is the upper half of the z-plane, show that the bilinear transformation $w = e^{i\alpha}\left(\frac{z - z_0}{z - z_0}\right)$ maps the upper half of the z-plane into the interior of the unit circle at the origin in the w-plane.

(b) Find the analytic function whose real part is $e^x(x\cos y - y\sin y)$.

(c) Show that the transform $w = z + \frac{(a^2 - b^2)}{4z}$ transforms the circle of radius $\frac{a+b}{2}$, centre at the origin, in the z-plane into ellipse of semi-axes a, b in the w-plane.

Or

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

(b) If $w = \phi + i\psi$ represents the complex potential for an electric field and $\psi = x^2 - y^2 + \frac{x}{x^2 + y^2}$, determine the function ϕ.

(c) Under the transformation $w = \frac{z - i}{1 - iz}$, find the map of the circle $|z| = 1$ in the w-plane.

Module 4

7. (a) Evaluate $\Delta^2\cos(cx + d)$, the interval of differencing being h.

(b) If $u_0 = 3, u_1 = 12, u_2 = 81, u_3 = 200, u_4 = 100, u_5 = 8$, find the value of $\Delta^5 u_0$.

(c) A function $f(x)$ is given by the following table. Find $f(0.2)$ by a suitable formula :

x :	0	1	2	3	4	5	6
$f(x)$:	178	183	190	202	218	222	230

Or

8. (a) Use Lagrange's interpolation formula to find the value of y when $x = 10$, if the following table of x and y is given :

x :	5	6	9	11
y :	12	13	14	16

(b) Apply Stirling's formula to find $f(0.42)$ if $f(0.30) = 0.1179, f(0.35) = 0.1368, f(0.40) = 0.1554, f(0.45) = 0.1736, f(0.50) = 0.1915$.

Module 5

9. (a) The following table gives the values of a function at equal intervals :

x :	0.0	0.5	1.0	1.5	2.0
$f(x)$:	0.3988	0.3522	0.2421	0.1290	0.0541

Evaluate $f(1.8), f'(1.5)$ and $\int_0^2 f(x)\,dx$, stating the formula used. (15 marks)

(b) Solve $u_{n+2} - 7u_{n+1} + 10u_n = 12e^{3n} + 4^n$. (5 marks)

Or