CBCS SCHEME

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17MAT11

First Semester B.E. Degree Examination, Dec.2018/Jan.2019
Engineering Mathematics - I

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Find the n^{th} derivative of $\frac{x}{(1+x)(1+2x)}$. (06 Marks)

b. Prove that the following curves cut orthogonally $r^n = a^n \cos n\theta$ and $r^n = b^n \sin n\theta$. (07 Marks)

c. Find the radius of curvature of the curve $r^n = a^n \cos n\theta$. (07 Marks)

OR

2 a. If $\cos^{-1}(y/b) = \log(x/n)^n$, then show that $x^2y_{n+2} + (2n+1)xy_{n+1} + 2n^2y_n = 0$. (06 Marks)

b. Find the pedal equation of the curve $r^2 = a^2 \sec 2\theta$. (07 Marks)

c. Find the radius of curvature for the curve $y^2 = \frac{4a^2(2a-x)}{x}$, where the curve meets the x – axis. (07 Marks)

Module-2

3 a. Obtain the Taylor's expansion of $\log_e x$ about $x = 1$ upto the term containing fourth degree. (06 Marks)

b. If $u = \text{cosec}^{-1}\left(\frac{x^{1/2}+y^{1/2}}{x^{1/3}+y^{1/3}}\right)$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = -\frac{1}{6}\tan u$. (07 Marks)

c. If $u = x + 3y^2 - z^3$, $v = 4x^2yz$, $w = 2z^2 - xy$, find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at (1, -1, 0). (07 Marks)

OR

4 a. Evaluate $\lim_{x\to 0}\left\{\frac{\sin 2x - 2\sin x}{x^3}\right\}$. (06 Marks)

b. Obtain the Maclaurin's expansion of the function $\log(1+x)$ upto 4^{th} degree terms. (07 Marks)

c. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$. (07 Marks)

Module-3

5 a. A particle moves along the curve, $x = 1 - t^3$, $y = 1 + t^2$ and $z = 2t - 5$. Find the components of velocity and acceleration at $t = 1$ in the direction $2i + j + 2k$. (06 Marks)

b. If $\vec{F} = (x + y + az)i + (bx + 2y - z)j + (x + cy + 2z)k$, find a, b, c such that Curl $\vec{F} = \vec{O}$ and then find ϕ such that $\vec{F} = \nabla\phi$. (07 Marks)

c. Prove that $\text{div}(\phi\vec{A}) = \phi(\text{div}\,\vec{A}) + \text{grad}\,\phi.\vec{A}$. (07 Marks)

OR

6 a. The position vector of a particle at time t is $\vec{r} = \cos(t-1)\,i + \sin h\,(t-1)\,j + t^3\,k$. Find the velocity and acceleration at t = 1. **(06 Marks)**

b. If $\vec{F} = \nabla(xy^3z^2)$, find div $\vec{F}$ and curl $\vec{F}$ at the point (1, -1, 1). **(07 Marks)**

c. Prove that Curl $(\phi\,\vec{A}) = \phi\,(\text{curl}\,\vec{A}) + \text{grad}\,\phi \times \vec{A}$. **(07 Marks)**

Module-4

7 a. Find the reduction formula for $\int_0^{\pi/2} \sin^n x\,dx$. **(06 Marks)**

b. Solve $x^3\frac{dy}{dx} - x^2y = -y^4\cos x$. **(07 Marks)**

c. Show that the family of parabolas $y^2 = 4a(x + a)$ is self orthogonal. **(07 Marks)**

OR

8 a. Evaluate $\int_0^{\infty} \frac{x^2}{(1+x^2)^{7/2}}dx$. **(06 Marks)**

b. Solve $(y^2\,e^{xy^2} + 4x^3)dx + (2xy\,e^{xy^2} - 3y^2)\,dy = 0$. **(07 Marks)**

c. A body in air at 25^0C cools from 100^0C to 75^0C in 1 minute. Find the temperature of the body at the end of 3 minutes. **(07 Marks)**

Module-5

9 a. Find the rank of the matrix

$$\begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$$ **(06 Marks)**

b. Find the numerically largest eigen value and the corresponding eigen vector of the matrix by power method :

$A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$ by taking the initial approximation to the eigen vector as [1, 0.8, -0.8]'.

Perform 3 iterations. **(07 Marks)**

c. Show that the transformation :
$y_1 = 2x_1 - 2x_2 - x_3$, $y_2 = -4x_1 + 5x_2 + 3x_3$ and $y_3 = x_1 - x_2 - x_3$ is regular and find the inverse transformation. **(07 Marks)**

OR

10 a. Solve $20x + y - 2z = 17$; $3x + 20y - z = -18$; $2x - 3y + 20z = 25$ by Gauss – Seidel method. **(06 Marks)**

b. Diagonalize the matrix $A = \begin{bmatrix} -19 & 7 \\ -42 & 16 \end{bmatrix}$. **(07 Marks)**

c. Reduce the quadratic form $2x_1^2 + 2x_2^2 + 2x_3^2 + 2x_1x_3$ into Canonical form, using orthogonal transformation. **(07 Marks)**

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17CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Engineering Chemistry

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What are ion selective electrodes? Discuss the construction and working of a glass electrode. **(07 Marks)**

b. Define Battery. Explain construction, working and uses of (Ni – Metal Hydride) battery. **(07 Marks)**

c. What are fuel cells? How it is different from a galvanic cell? Mention any two advantages of fuel cell. **(06 Marks)**

OR

2 a. Derive Nernst equation for electrode potential. **(06 Marks)**

b. What are concentration cells? The emf of the cell

$Ag \mid AgNO_3\ (0.0083M) \parallel AgNO_3\ (XM) \mid Ag$

was found to be 0.074 V at 298 K. Calculate the value of X and write the cell reactions. **(07 Marks)**

c. Describe the construction, working and applications of methanol –oxygen fuel cell. **(07 Marks)**

Module-2

3 a. Define corrosion. Explain electrochemical theory of corrosion by taking Iron as an example. **(07 Marks)**

b. What is Cathodic protection? Explain Sacrificial Anode and Impressed Current method for prevention of corrosion. **(07 Marks)**

c. Define electroless plating. What are the differences between electroplating and electroless plating? **(06 Marks)**

OR

4 a. How does the following factors affect the rate of corrosion?
(i) Nature of the corrosion product
(ii) Temperature
(iii) pH. **(06 Marks)**

b. Explain the process of electroplating of chromium and its applications. **(07 Marks)**

c. Discuss the process of electroless plating of copper and explain its application in the manufacture of Printed Circuit Board (PCB). **(07 Marks)**

Module-3

5 a. Define Gross and Net calorific values of a solid on a liquid fuel. Calculate the gross and net calorific value of a sample of coal 0.5 g of which when burnt in a bomb calorimeter raised the temperature of water from 293 K to 296.4 K. The mass of water is 1000 g and water equivalent of calorimeter is 350 g. The specific heat of H_2O is 4.187 kJ/kg/K, latent heat of steam is 2454 kJ/kg. The coal sample contains 93% carbon, 5% hydrogen and 2% ash. **(07 Marks)**

b. What is meant by knocking? What are its ill effects? Discuss the mechanism of knocking by giving relevant equations. **(07 Marks)**

c. Explain the construction and working of a PV cell. **(06 Marks)**

OR

6 a. What is cracking of petroleum? Describe the fluidized bed catalytic cracking. **(07 Marks)**

b. Explain the production of solar grade silicone by Union Carbide process. **(07 Marks)**

c. Write a note on :
(i) Power alcohol (ii) Biodiesel. **(06 Marks)**

Module-4

7 a. What is addition polymerization? Illustrate the mechanism of addition polymerization by taking Vinyl Chloride as an example. **(07 Marks)**

b. Describe the manufacture of (i) PMMA (ii) Epoxy resin. Mention the uses. **(07 Marks)**

c. A polymer sample containing 100, 250 and 300 molecules having molar mass 10^3 g/mol, 10^4 g/mol and 10^5 g/mol respectively. Calculate the number average and weight average molecular mass of polymer. **(06 Marks)**

OR

8 a. What is glass transition temperature? Explain any three factors affecting T_g. **(07 Marks)**

b. What are elastomers? Give the synthesis and applications of
(i) Silicone rubber (ii) Polycarbonate. **(07 Marks)**

c. What are conducting polymers? Discuss the conduction mechanism in polyaniline. **(06 Marks)**

Module-5

9 a. Define Priming and Foaming. Mention the reasons for priming and foaming in the boiler with any two prevention steps. **(07 Marks)**

b. What is desalination? Explain the desalination of water by reverse osmosis. **(06 Marks)**

c. Describe the synthesis of nano-materials by Sol-gel process. **(07 Marks)**

OR

10 a. Define COD. In COD test 25.5 cm^3 and 12.5 cm^3 of 0.05N FAS solution and required for blank and sample titration respectively. The volume of the test sample used is 25 cm^3. Calculate the COD of the sample solution. **(07 Marks)**

b. Explain the precipitation method for preparation of nanomaterials with an example. **(07 Marks)**

c. Write a note on Fullerenes and Composites. **(06 Marks)**

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17PHY12/22

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Engineering Physics

Time: 3 hrs. Max. Marks: 100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. Physical constants; Velocity of light, $c = 3 \times 10^8$ m/s mass of the electron, $m = 9.1 \times 10^{-31}$ kg Planck's constant, $h = 6.625 \times 10^{-34}$ JS charge of electron, $e = 1.6 \times 10^{-19}$ C Boltzmann's constant $K = 1.382 \times 10^{-23}$ J/K Avagadro's number, $N_A = 6.02 \times 10^{26}$/K mole.

Module-1

1 a. Define group velocity and phase velocity and hence obtain the relation between them. **(06 Marks)**

b. Mention any four important characteristics of matter waves. **(04 Marks)**

c. Assuming time independent Schrodinger wave equation, obtain an expressions for energy eigen value and eigen function for an electron in one dimensional potential well of infinite wall height. **(07 Marks)**

d. The velocity of uncertainty electron was observed to be 5×10^3 m/s. Using Heisenberg uncertainty principle. Calculate the uncertainty of an electron in its position. **(03 Marks)**

OR

2 a. Mention assumption of Planck's law. Obtain Wien's law and Rayleigh-Jean's law from Planck's law for shorter and longer wavelength limits. **(07 Marks)**

b. Set up time independent one dimensional Schrodinger wave equation. **(07 Marks)**

c. Briefly explain probability density of wave function. **(03 Marks)**

d. An electron has K.E. 120 eV. Find its de Broglie wavelength. **(03 Marks)**

Module-2

3 a. Discuss the merits of quantum free electron theory. **(06 Marks)**

b. Derive an expression for electrical conductivity of an intrinsic semiconductor. **(05 Marks)**

c. What is Meissner effect? Explain Type-I and Type-II superconductors. **(05 Marks)**

d. Find the temperature at which there is 1% Probability that a state with energy 0.5 eV above Fermi energy is occupied. **(04 Marks)**

OR

4 a. Derive an expression for electrical conductivity based on quantum free electron theory. **(06 Marks)**

b. Define mobility factor, drift velocity, mean collision time and relaxation time. **(04 Marks)**

c. What is superconductivity? Explain BCS theory of superconductivity. **(06 Marks)**

d. For intrinsic gallium arsenide at room temperature, the electrical conductivity is 10 $ohm^{-1}m^{-1}$. The electron and hole mobilities are 8.85 m^2/vs and 0.04 m^2/vs respectively. Calculate the intrinsic carrier concentration. **(04 Marks)**

Module-3

5 a. Obtain an expression for energy density of radiation under thermal equilibrium condition in terms of Einstein's coefficients. **(07 Marks)**

b. Explain the recording and reconstruction technique of holography. **(05 Marks)**

c. Discuss point to point optical fiber communication system with neat block diagram. **(05 Marks)**

d. Calculate V-number for an optical fiber of core diameter 45×10^{-6}m and with refractive indices 1.45 and 1.40 respectively for core and cladding when the wavelength of the propagation wave is 700×10^{-9}m. **(03 Marks)**

OR

6 a. Describe the construction and working of CO_2 laser with suitable diagrams and mention some important applications. **(08 Marks)**

b. Explain the condition for lasing action. **(04 Marks)**

c. Derive an expression for numerical aperture of an optical fiber and hence show the condition for propagation. The refractive indices of core and cladding are 1.50 and 1.48 respectively. Calculate the numerical aperture of an optical fiber. **(08 Marks)**

Module-4

7 a. Define atomic packing factor, calculate the atomic packing factor for SC, BCC and FCC structure. **(08 Marks)**

b. Explain in brief the seven crystal system with neat diagrams. **(07 Marks)**

c. What are Miller indices? Explain the procedure of finding Miller indices. **(05 Marks)**

OR

8 a. Describe the construction and working of Bragg's spectrometer and hence how it is used to determine crystal structure. **(08 Marks)**

b. Derive an expression for inter planar spacing in terms of Miller indices. **(06 Marks)**

c. Explain the crystal structure of diamond with neat sketch. **(06 Marks)**

Module-5

9 a. Explain the construction and working of Reddy shock tube and explain any three important applications. **(08 Marks)**

b. Describe the principle, construction and working of SEM with neat diagram. **(08 Marks)**

c. Explain the types of Carbon nano tubes with diagrams. **(04 Marks)**

OR

10 a. Explain Rankine-Hugoniot equations for a normal shock wave. **(06 Marks)**

b. Describe the top down approach of preparation of nanomaterials by ball milling method. **(05 Marks)**

c. Describe Arc discharge method of obtaining CNTs with neat diagram. **(05 Marks)**

d. Define Mach number, subsonic wave, ultrasonic wave and supersonic wave. **(04 Marks)**

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17PCD13/23

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Programming in C and Data Structures

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is an algorithm? Write an algorithm to find largest of 3 numbers. **(08 Marks)**

b. Explain any five operators used in C language. **(10 Marks)**

c. Explain two types of type conversions. **(02 Marks)**

OR

2 a. Explain the structure of 'C' program with an example program. **(10 Marks)**

b. Explain scanf( ) & printf( ) function in C language with syntax and example program. **(10 Marks)**

Module-2

3 a. Explain if, if-else, nested if-else and cascaded if-else with examples and syntax. **(10 Marks)**

b. Write a C program to simulate simple calculator that performs arithmetic operations using switch statement. An error message should be displayed, if any attempt is made to divide by zero. **(10 Marks)**

OR

4 a. List the differences between while loop and do-while loop. Write a C program to find the sum of natural numbers from 1 to N using for loop. **(10 Marks)**

b. Write a C program to read a year as an input and find whether it is a LEAP YEAR or not. **(04 Marks)**

c. Write a C program to find reverse of a number and check whether it is a PALINDROME or not. **(06 Marks)**

Module-3

5 a. What is an array? Explain the declaration and initialization of one dimensional and two dimensional array with an example. **(10 Marks)**

b. Explain any three string manipulation library function with example. **(06 Marks)**

c. Write a C program to implement string copy operation STRCOPY(Str1, Str2) that copies a string Str1 to another string Str2 without using library function. **(04 Marks)**

OR

6 a. What is function? Explain the two categories of argument passing techniques, with example. **(10 Marks)**

b. Write a C function isprime(num) that accepts an integer argument and return 1 if the argument is a prime or a 0 otherwise. Write a program that invokes this function to generate prime number between the given range. **(10 Marks)**

Module-4

7 a. What is structure data type? Explain. **(04 Marks)**

b. Show how a structure variable is passed as a parameter to a function, with an example. **(06 Marks)**

c. Explain the concept of array of structures, with a suitable C program. **(10 Marks)**

OR

8 a. What is FILE? Explain fopen( ), fclose( ) functions. **(05 Marks)**

b. Explain various modes of FILE. **(05 Marks)**

c. Given two files "Studentname.txt" and "USN.txt" that contains students name and USN respectively. Write a C-program to create a new file called "output.txt" and copy the contents of files "Studentname.txt" and "USN.txt" into output file in the sequence shown below :

Student name	USN
Name – 1	USN – 1
Name – 2	USN – 2
–	–
–	–
–	–
–	–

(10 Marks)

Module-5

9 a. Define a pointer. Explain how pointer variable is declared and initialized. **(05 Marks)**

b. What are primitive and non – primitive data types? Give examples. **(05 Marks)**

c. Write a program using pointers to compute sum, mean and standard deviation of all elements stored in an array of "n" real numbers. **(10 Marks)**

OR

10 a. Explain any 2 pre- processor directives in 'C' language. **(05 Marks)**

b. What is a STACK? Explain its applications. **(05 Marks)**

c. What is a QUEUE? Explain with example. **(05 Marks)**

d. Write a program to swap 2 numbers using call-by-reference method. **(05 Marks)**

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17CIV13/23

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Elements of Civil Engineering and Mechanics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain briefly scope of civil engineering in, i) Structural Engineering ii) Transportation Engineering. **(06 Marks)**

b. Explain briefly the impact of infrastructure on the socioeconomic development of country. **(06 Marks)**

c. State and explain different elements of force. **(04 Marks)**

d. Find the moment of force F = 600N about 'A' as shown in Fig.Q.1(d). **(04 Marks)**

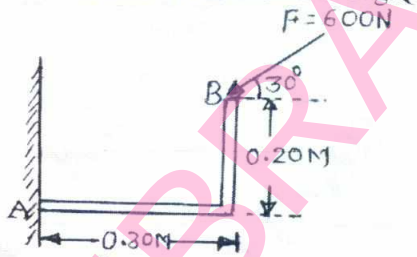

Fig.Q.1(d)

OR

2 a. State and explain principle of transmissibility of forces. **(04 Marks)**

b. Differentiate between flexible pavement and rigid pavement. **(04 Marks)**

c. A block of 200N is kept on the inclined plane and is fixed to the plane. Find the components of weight in the direction along the plane and perpendicular to the plane as indicated in Fig.Q.2(c). **(06 Marks)**

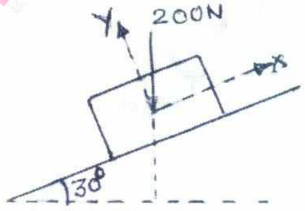

Fig.Q.2(c)

d. Replace the horizontal force of 600N acting on the lever by an equivalent system consisting of a force and a couple at '0' as shown in Fig.Q.3. **(06 Marks)**

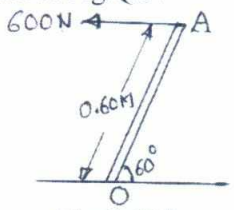

Fig.Q.2(d)

Module-2

3 a. State and prove law of parallelogram of forces. **(06 Marks)**

b. Explain with neat diagram,
   i) Coefficient of friction
   ii) Angle of repose
   iii) Cone of friction. **(06 Marks)**

c. The four coplanar concurrent forces acting at a point are as shown in Fig.Q.3(c). One of the force is unknown and its magnitude is as shown by 'F'. The resultant of these forces is 5kN and is acting along x-axis. Determine the force F and its inclination 'θ' with x-axis. **(08 Marks)**

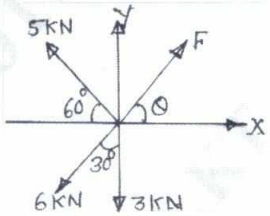

Fig.Q.3(c)

OR

4 a. State and prove Lami's theorem. **(04 Marks)**

b. Compute the tensions in the strings AB, BC and CD as shown in Fig.Q.4(b). **(08 Marks)**

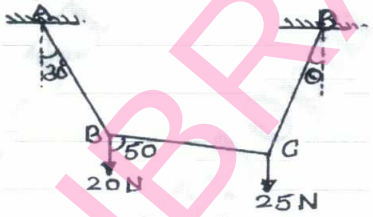

Fig.Q.4(b)

c. Two blocks A and B weighing 2kN and 1.5kN are connected by a wire passing over a smooth frictionless pulley as shown in Fig.Q.4(c). Determine the magnitude of force 'P' required to impound motion. Take μ = 0.20. **(08 Marks)**

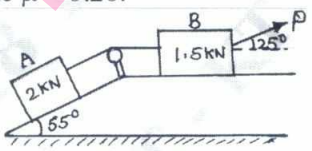

Fig.Q.4(c)

Module-3

5 a. State and explain Varignon's theorem. **(06 Marks)**

b. What are the types of loads and supports a beam may have? Explain briefly with neat sketches. **(06 Marks)**

c. Determine the position, magnitude and direction of resultant of the forces acting on a body as shown in Fig.Q.5(c) with respect to point A. **(08 Marks)**

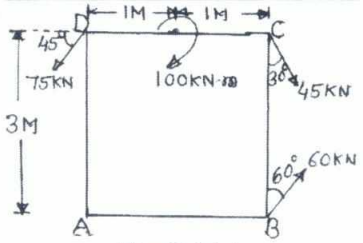

Fig.Q.5(c)

OR

6 a. Define Equillibriant. Explain the conditions of equilibrium of coplanar concurrent force system and coplanar non concurrent force system. **(06 Marks)**

b. Find the reactions for a cantilever beam as shown in Fig.Q.6(b) **(06 Marks)**

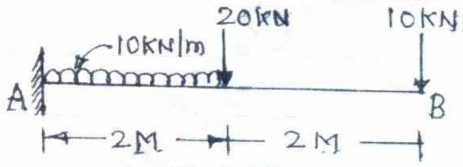

Fig.Q.6(b)

c. Determine the support reactions for the overhanging beam as shown in Fig.Q.6(c). **(08 Marks)**

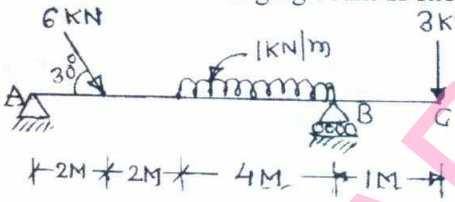

Fig.Q.6(c)

Module-4

7 a. Determine the centroid of a semicircular lamina of radius 'R' by the method of integration. **(08 Marks)**

b. Find the polar moment of inertia of the section as shown in Fig.Q.7(b), about an axis passing through its centroid and find polar radius of gyration. **(12 Marks)**

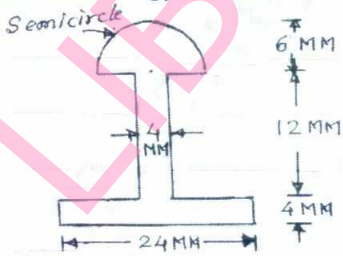

Fig.Q.7(b)

OR

8 a. State and prove parallel axis theorem. **(06 Marks)**

b. With reference to the coordinate axes x and y, locate the centroid of the area shown in Fig.Q.8(b). **(14 Marks)**

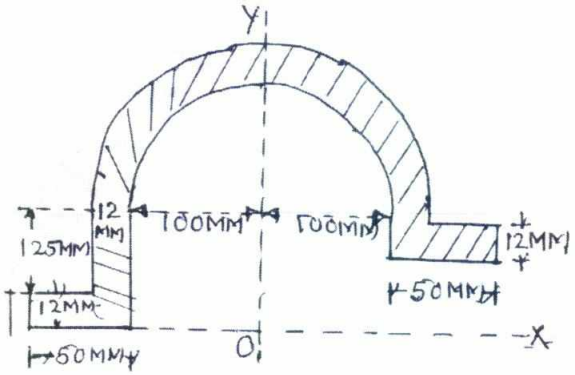

Fig.Q.8(b)

Module-5

9 a. Define the following: i) Kinematics ii) Kinetics iii) Motion iv) Path. **(06 Marks)**

b. What is centrifugal force and super elevation? **(06 Marks)**

c. A Burglar's car starts at an acceleration of $2m/sec^2$. A police vigilant party came after 5 seconds and continued to chase the Burglar's car with a uniform velocity of 20m/sec. Find the time taken in which the police van will overtake the car. **(08 Marks)**

OR

10 a. Define the following: i) Uniform velocity ii) Reactilinear motion iii) Curvilinear motion iv) Projectile. **(04 Marks)**

b. Determine the position at which the ball is thrown up the plane will strike the incline plane as shown in Fig.Q.10(b). The initial velocity is 30m/sec and angle of projection is $\tan^{-1}\left(\frac{4}{3}\right)$ with horizontal. **(08 Marks)**

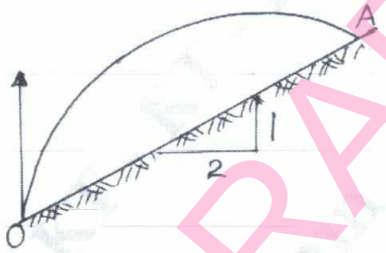

Fig.Q.10(b)

c. A stone is dropped into a well and a sound of splash is heard after 4 seconds. Find the depth of well if the velocity of sound is 350 m/sec. **(08 Marks)**

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17CED14/24

First/Second Semester B.E. Degree Examination, December 2018

COMPUTER AIDED ENGINEERING DRAWING

Time: 3 Hours (COMMON TO ALL BRANCHES) Max. Marks: 100

Note: *1. Answer three full questions. 2. Use A4 sheets supplied.*
3. Draw to actual scale. 4. Missing data, if any, may be assumed suitably.

1. a. A point 'P' is 30 mm in front of VP, 40 mm above HP and 50 mm from RPP. Draw its projections. **10 Marks**

   b. Top view of a line AB 80 mm long measures 65 mm and length of the front view is 50 mm. The end A is on HP and 15 mm in front of VP. Draw the projections. **20 Marks**

OR

1. A pentagonal lamina of edges 25 mm is resting on VP with one of its sides such that the surface makes an angle 60° with VP. The edge on which it rests is inclined at 45° to HP. Draw its projections. **30 Marks**

2. A pentagonal pyramid 25 mm sides of base and 50 mm axis length is suspended freely from a corner of its base. Draw the projections of the pyramid when the axis appears to be inclined to VP at 45°. **40 Marks**

3. A hexagonal pyramid of sides 35 mm and altitude 65 mm is resting on HP on its base with two of the base sides perpendicular to VP. The pyramid is cut by a plane inclined at 30° to HP and perpendicular to VP and is intersecting the axis at 30 mm above the base. Draw the development of the remaining portion of the pyramid. **30 Marks**

OR

3. Three cubes of sides 60 mm, 40 mm, 20 mm are placed centrally one above the other in ascending order of their side. Draw the isometric projection of the combination. **30 Marks**

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17EME14/24

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain petroleum based gaseous fuels. **(06 Marks)**

b. Explain the principle and working of a wind will with neat sketch. **(08 Marks)**

c. Bio-fuels are alternate for fosil fuels, explain. **(06 Marks)**

OR

2 a. Explain with neat sketch the construction and working of Babcock and Wilcox boiler. **(10 Marks)**

b. List the differences between fire tube and water tube boilers. **(06 Marks)**

c. Explain any 4 devices which are necessary for safe operation of boilers. **(04 Marks)**

Module-2

3 a. Explain with neat sketch Parson turbine and its pressure velocity diagram. **(08 Marks)**

b. List the differences between open cycle and closed cycle gas turbine. **(06 Marks)**

c. Explain the constructions and working of a Kaplan turbine with neat sketch. **(06 Marks)**

OR

4 a. Bring out the comparisons between 2-stroke and 4-storke IC engine. **(06 Marks)**

b. Explain with neat sketch a 4 stroke engine where combustion of fuel takes place at constant pressure. **(07 Marks)**

c. A gas engine working on a 4 stroke cycle has a cylinder diameter of 0.25m and length 0.45m and running at 180RPM. Its mechanical efficiency is 80% and when man effective pressure is 6 bar. Find the indicated power, break power and frictional power. What is its fuel consumption rate (kg/hr) and break specific fuel consumption (kg/kw h) if the energy content of the fuel is 42,000 kJ/kg and brake thermal efficiency is 25%. **(07 Marks)**

Module-3

5 a. Explain knurling operations with a neat sketch. **(06 Marks)**

b. Explain with neat sketches counter sinking and counter boring operations. **(08 Marks)**

c. List the various milling operations and explain a milling operation using side and face cutter. **(06 Marks)**

OR

6 a. Classify robots based on physical configuration and explain a robot which has a work envelop of hemisphere with neat sketch. **(08 Marks)**

b. Explain the necessity of automation and important features of flexible automation. **(06 Marks)**

c. List any 2 advantages, limitations and applications of NC/CMC machines. **(06 Marks)**

Module-4

7 a. Explain composite materials and its need in today's word. **(06 Marks)**

b. Classify Ferrous metals with suitable example. **(06 Marks)**

c. Define non-ferrous metals and explain any two non-ferrous metals and two alloys. **(08 Marks)**

OR

8 a. List out the comparison between soldering and brazing. **(06 Marks)**

b. Explain with neat sketch the electrodes used in arc welding and its functions. **(06 Marks)**

c. Explain oxy-acitylene welding process with neat sketch. **(08 Marks)**

Module-5

9 a. Define refrigerant and explain commonly used refrigerant (any 3). **(06 Marks)**

b. Explain with neat sketch the principles and working of a vapour compression refrigerator. **(08 Marks)**

c. Define the following : i) ton of refrigeration ii) coefficient of performance iii) relative COP. **(06 Marks)**

OR

10 a. Explain with a neat sketch, working of room air conditioner. **(08 Marks)**

b. Explain with neat sketch the working of vapor absorbtion refrigerator. **(08 Marks)**

c. List out the properties of a good refrigerant. **(04 Marks)**

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17ELE15/25

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. State and explain Kirchoff's law as applied to DC circuits. **(07 Marks)**

b. What are the differences between series and parallel circuit. **(06 Marks)**

c. Find the inductance of a coil of 200 turns wound on a paper core tube of 25cm length and 5cm radius. Also calculate energy stored in it if current rises from zero to 5A (μ_r for paper = 1). **(07 Marks)**

OR

2 a. State and explain the faradays law of Electromagnetic induction (EMI). **(06 Marks)**

b. Define the coefficient of coupling and find its relation with L_1,L_2 and M. **(06 Marks)**

c. Find the currents I_1, I_2 and I_3 and the voltages V_a, V_b in the network shown below :

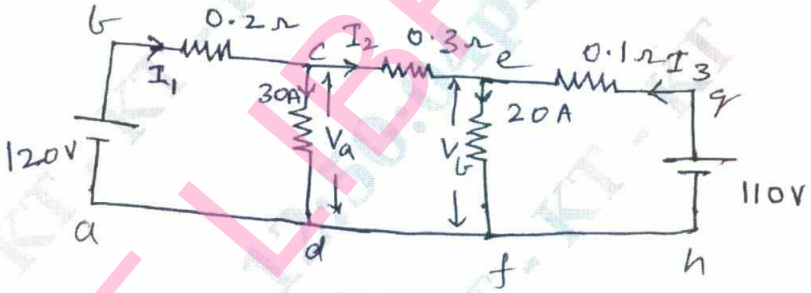

Fig.Q2(c)

(08 Marks)

Module-2

3 a. With a neat sketch, explain the construction of the various parts of DC generator. **(08 Marks)**

b. Explain with a neat diagram the constructional features and operation of an induction type single phase energy meter. **(07 Marks)**

c. Explain the significance of back Emf in DC motor. **(05 Marks)**

OR

4 a. Derive the EMF equation of DC generator. **(06 Marks)**

b. Describe with a neat sketch, the constructional details and working principle of a dynamometer type wattmeter. **(06 Marks)**

c. A 4 pole, 100V shunt generator with lap connected armature, having field and armature resistance of 50Ω and 0.1Ω respectively. Supplies a load of sixty lamps. Each lamp rated 100V, 40W. Calculate the total armature current, the current per path and the generated emf. Allow a contact drop of 1 volt per brush. **(08 Marks)**

Module-3

5 a. Derive an expression for power in pure inductance circuit and draw voltage, current and power waveforms. **(06 Marks)**

b. Draw and explain the wiring diagrams for the two-way control of lamp. **(06 Marks)**

c. A choke coil takes a current of 2A lagging 60° behind the applied voltage of 200V at 50Hz. Calculate the resistance, inductance and impedance of the coil. Also determine the power consumed when it is connected across 100V, 25Hz supply. **(08 Marks)**

OR

6 a. Derive an expression for power in series resistance and inductance circuit and draw voltage and current waveform. **(07 Marks)**

b. With a neat diagram, explain pipe earthing. **(05 Marks)**

c. A voltage V = 100 sin 314 t is applied to a circuit consisting of a 25Ω resistor and an 80 μF capacitor in series. Determine :

i) Peak value of current

ii) Power factor

iii) Total power consumed by the circuit. **(08 Marks)**

Module-4

7 a. In a three phase delta connection, find the relation between line and phase values of currents and voltages. Also derive the equation for three phase power. **(06 Marks)**

b. Show that the two wattmeters are sufficient to measure three phase power. Also derive an expression for the power factor in terms of wattmeter readings. **(06 Marks)**

c. A 12 pole 500 rpm star connected alternator has 48 slots with 15 conductors per slot. The flux per pole is 0.02wbs. The winding factor is 0.97 and pitch factor is 0.98. Calculate the phase emf and line emf. **(08 Marks)**

OR

8 a. Mention the advantages of three phase system over single phase system. **(06 Marks)**

b. With neat sketches, explain the construction of salient pole alternator. **(07 Marks)**

c. A balanced star connected load of (8 + J6)w per phase is connected to a three phase, 230V supply. Find the line current, power factor, power and reactive voltampere and total voltamper. **(07 Marks)**

Module-5

9 a. Derive EMF equation of transformer. **(07 Marks)**

b. Explain construction and working principle of a transformer with diagram. **(07 Marks)**

c. The frequency of the emf in the stator of a 4 pole induction motor is 50Hz and in the rotor is 1.5Hz. What is the slip and at what speed is the motor running. **(06 Marks)**

OR

10 a. Derive the condition for which the efficiency of a transformer is maximum. **(06 Marks)**

b. What is slip in an induction motor? Explain why slip is never zero in an induction motor. **(06 Marks)**

c. The maximum efficiency at full load and unity pf of a single phase 25KVA, 50/1000V, 50Hz transformer is 98%, determine the efficiency at :

i) 75% load, 0.9 pf ii) 50% load, 0.9pf. **(08 Marks)**

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17ELN15/25

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Basic Electronics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the operation of PN junction diode under forward and reverse bias condition. **(07 Marks)**

b. Discuss the load and line regulations using zener diode with neat circuit diagrams and appropriate expressions. **(08 Marks)**

c. Design a 9V DC reference source consisting of a zener diode and series connected resistor to operate from a 24V supply. [$I_{ZT} = I_Z = 20$ mA]. **(05 Marks)**

OR

2 a. With a neat circuit diagram, explain the operation of centre tapped full wave rectifier. Draw input and output waveforms. **(07 Marks)**

b. Draw common emitter circuit, sketch input and output characteristics and explain three regions of operation. **(08 Marks)**

c. Derive the relationship between α and β. Find I_C and I_E for the transistor with $\alpha = 0.99$ and $I_B = 20\mu A$. **(05 Marks)**

Module-2

3 a. Precisely analyse the circuit of voltage divider bias. **(08 Marks)**

b. What is Op-Amp? List out the ideal and particle characteristics of Op-Amp. **(07 Marks)**

c. Calculate the output voltage of a summer. Given : $R_1 = 200k\Omega$, $R_2 = 250k\Omega$, $R_3 = 500k\Omega$. $R_f = 1M\Omega$, $V_1 = -2V$, $V_2 = -1V$ and $V_3 = +3V$. **(05 Marks)**

OR

4 a. Design a base bias circuit to have $V_{CE} = 5V$ $I_C = 5mA$. The supply voltage is 15V and transistor has $h_{fe} = 100$. **(07 Marks)**

b. Derive an expression for the voltage gain of inverting and Non-inverting amplifier. **(08 Marks)**

c. Analyse the circuit of an op-amp as an integrator. **(05 Marks)**

Module-3

5 a. Interpret the following :

i) $(48350)_{10} = (\quad)_{16} = (\quad)_8$

ii) $(FACE)_{16} = (\quad)_2 = (\quad)_8$

iii) $(847.951)_{10} = (\quad)_8$. **(06 Marks)**

b. Write the logical symbol, truth table and Boolean expressions of all the logic gates : (AND, OR, NOT, NOR, NAND, EX-OR, EX-NOR). **(09 Marks)**

c. Realize EX –OR gate using NAND gates only. **(05 Marks)**

OR

6 a. Which are the universal gates? Realize basic gates using universal gates? **(07 Marks)**

b. Design a full adder using two half adder. Derive the necessary expressions. **(08 Marks)**

c. Perform the subtraction using 2's complement method :

i) $(11010)_2 - (10000)_2$

ii) $(11)_{10} - (15)_{10}$. **(05 Marks)**

Module-4

7 a. With diagram and truth table explain NAND gate latch. **(06 Marks)**

b. Explain the operation of 8051 microcontroller with neat block diagram. Mention the salient features. **(10 Marks)**

c. Distinguish between flip-flop and latch. List out the applications of flip-flop. **(04 Marks)**

OR

8 a. Explain the operation of clocked RS flip-flop. **(07 Marks)**

b. With a neat block diagram, explain microcontroller based stepper motor control system. **(07 Marks)**

c. With a diagram and truth table, explain NOR Gate Latch. **(06 Marks)**

Module-5

9 a. What is modulation? Explain the need for modulation. **(04 Marks)**

b. Derive the expression for frequency modulation with a neat waveforms. **(10 Marks)**

c. Explain the piezoelectric and photo electric transducers. **(06 Marks)**

OR

10 a. Discuss the comparison between AM and FM modulation. **(06 Marks)**

b. Explain the construction and principle of operation of LVDT. **(07 Marks)**

c. A carrier of 1MHz, with 400 Watt of its power is amplitude modulated with a sinusoidal signal of 2500 Hz. The depth of modulation 75%. Calculate the side band frequencies, the band width, the power in the side bands and the total power in the modulated wave. **(07 Marks)**

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17MAT21

Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Engineering Mathematics – II

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Solve $y''' - y'' + 4y' - 4y = \sin h(2x+3)$. **(06 Marks)**

b. Solve $y'' + 2y' + y = 2x + x^2$. **(07 Marks)**

c. Solve $(D^2+1)y = \tan x$ by method of variation of parameter. **(07 Marks)**

OR

2 a. Solve $(D^3 - 1)y = 3\cos 2x$, where $D = \frac{d}{dx}$. **(06 Marks)**

b. Solve $y'' - 6y' + 9y = 7e^{-2x} - \log 2$. **(07 Marks)**

c. Solve $y'' - 3y' + 2y = x^2 + e^x$ by the method of un-determined coefficients. **(07 Marks)**

Module-2

3 a. Solve $x^2y'' + xy' + 9y = 3x^2 + \sin(3\log x)$. **(06 Marks)**

b. Solve $y\left(\frac{dy}{dx}\right)^2 + (x-y)\frac{dy}{dx} - x = 0$. **(07 Marks)**

c. Solve $(px - y)(py + x) = 2p$ by reducing it into Cluiraut's form by taking $X = x^2$ and $Y = y^2$. **(07 Marks)**

OR

4 a. Solve $(3x+2)^2 y'' + 3(3x+2)y' - 36y = 8x^2 + 4x + 1$. **(06 Marks)**

b. Solve $p^2 + 2py\cot x - y^2 = 0$. **(07 Marks)**

c. Show that the equation $xp^3 + px - py + 1 - y = 0$ is Clairaut's equation and find its general and singular solution. **(07 Marks)**

Module-3

5 a. Form the partial differential equation of the equation $lx + my + nz = \phi(x^2 + y^2 + z^2)$ by eliminating the arbitrary function. **(06 Marks)**

b. Solve $\frac{\partial^2 u}{\partial x^2} = x + y$. **(07 Marks)**

c. Derive the one dimensional heat equation $u_t = c^2 . u_{xx}$ **(07 Marks)**

OR

6 a. Form the partial differential equation of the equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ by eliminating arbitrary constants. **(06 Marks)**

b. Solve $\frac{\partial^2 z}{\partial y^2} = z$, given that $z = 0$ and $\frac{\partial z}{\partial y} = \sin x$ when $y = 0$. **(07 Marks)**

c. Obtain the solution of one dimensional wave equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ by the method of separation of variables for the positive constant. **(07 Marks)**

Module-4

7 a. Evaluate $\int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x+y+z)\,dy\,dx\,dz$. **(06 Marks)**

b. Evaluate $\int_{0}^{1}\int_{0}^{\sqrt{1-x^2}} y^2\,dy\,dx$ by changing the order of integration. **(07 Marks)**

c. Derive the relation between Beta and Gamma function as $\beta(m,n) = \frac{\lfloor m \cdot \lfloor n}{\lfloor m+n}$ **(07 Marks)**

OR

8 a. Evaluate $\int_{0}^{1}\int_{0}^{\sqrt{1-y^2}} x^3 \cdot y\,dx\,dy$ **(06 Marks)**

b. Evaluate $\int_{-a}^{a}\int_{0}^{\sqrt{a^2-x^2}} \sqrt{x^2+y^2}\,dy\,dx$ by changing into polar coordinates. **(07 Marks)**

c. Evaluate $\int_{0}^{\infty} \frac{dx}{1+x^4}$ by expressing in terms of beta function. **(07 Marks)**

Module-5

9 a. Find (i) $L[t\cos at]$ (ii) $L\left[\frac{\sin at}{t}\right]$. **(06 Marks)**

b. Find the Laplace transform of the full wave rectifier $f(t) = E\sin wt$, $0 < t < \frac{\pi}{w}$ with period $\frac{\pi}{w}$. **(07 Marks)**

c. Solve $y'' + k^2 y = 0$ given that $y(0) = 2$, $y'(0) = 0$ using Laplace transform. **(07 Marks)**

OR

10 a. Find Inverse Laplace transform of $\frac{s+2}{s^2(s+3)}$. **(06 Marks)**

b. Express the function

$$f(t) = \begin{cases} \cos t, & 0 < t < \pi \\ \sin t, & t > \pi \end{cases}$$

in terms of unit step function and hence find its Laplace transform. **(07 Marks)**

c. Find Inverse Laplace transform of $\frac{1}{s(s^2+a^2)}$ using convolution theorem. **(07 Marks)**

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