

CBCS Scheme

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17MAT11

First Semester B.E. Degree Examination, Dec.2017/Jan.2018

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 $\cos x \cos 2x$. (06 Marks)
- b. Find the angle between the curves $r = a \log \theta$, $r = \frac{a}{\log \theta}$. (07 Marks)
- c. Find the radius of curvature of the curve $r = a(1 + \cos \theta)$. (07 Marks)

OR

- 2 a. If $y = a \cos(\log x) + b \sin(\log x)$, prove that $x^2 y_{n+2} + (2n+1)xy_{n+1} + (n^2+1)y_n = 0$. (06 Marks)
- b. With usual notations prove that the pedal equation in the form $\frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4} \left(\frac{dr}{d\theta}\right)^2$. (07 Marks)
- c. Find the radius of curvature of the curve $y^2 = \frac{a^2(a-x)}{x}$ at the point $(a, 0)$. (07 Marks)

Module-2

- 3 a. Find the Taylor's series of $\log x$ in powers of $(x-1)$ upto fourth degree terms. (06 Marks)
- b. If $U = \tan^{-1}\left(\frac{x^3+y^3}{x+y}\right)$, prove that $x \frac{\partial U}{\partial x} + y \frac{\partial U}{\partial y} = \sin 2U$ by using Euler's theorem. (07 Marks)
- c. If $U = x + 3y^2$, $V = 4x^2yz$, $W = 2z^2 - xy$, evaluate $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at the point $(1, -1, 0)$. (07 Marks)

OR

- 4 a. Evaluate $\lim_{x \rightarrow 0} \left(\frac{a^x + b^x + c^x}{3} \right)^{\frac{1}{x}}$. (06 Marks)
- b. Find the Maclaurin's expansion of $\log(\sec x)$ upto x^4 terms. (07 Marks)
- c. If $z = f(x, y)$, where $x = r \cos \theta$, $y = r \sin \theta$, prove that $\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 = \left(\frac{\partial z}{\partial r}\right)^2 + \frac{1}{r^2} \left(\frac{\partial z}{\partial \theta}\right)^2$. (07 Marks)

Module-3

- 5 a. A particle moves along the curve $\vec{r} = (t^3 - 4t)\hat{i} + (t^2 + 4t)\hat{j} + (8t^2 - 3t^3)\hat{k}$. Find the velocity and acceleration vectors at time t and their magnitudes at $t = 2$. (06 Marks)
- b. If $\vec{f} = (x + y + 1)\hat{i} + \hat{j} - (x + y)\hat{k}$, prove that $\vec{f} \cdot \text{curl } \vec{f} = 0$. (07 Marks)
- c. Prove that $\text{div}(\text{curl } \vec{A}) = 0$. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. A particle moves along the curve $\vec{r} = 2t^2\vec{i} + (t^2 - 4t)\vec{j} + (3t - 5)\vec{k}$. Find the components of velocity and acceleration along $\vec{i} - 3\vec{j} + 2\vec{k}$ at $t = 2$. (06 Marks)
- b. If $\vec{f} = \text{grad}(x^3y + y^3z + z^3x - x^2y^2z^2)$, find $\text{div } \vec{f}$ and $\text{curl } \vec{f}$. (07 Marks)
- c. Prove that $\text{curl}(\text{grad } \phi) = 0$. (07 Marks)

Module-4

- 7 a. Evaluate $\int_0^{2a} \frac{x^2}{\sqrt{2ax - x^2}} dx$. (06 Marks)
- b. Solve $\frac{dy}{dx} + y \tan x = y^3 \sec x$. (07 Marks)
- c. Find the orthogonal trajectories of $r^n = a^n \cos n\theta$. (07 Marks)

OR

- 8 a. Find the reduction formula for $\int \cos^n x dx$ and hence evaluate $\int_0^{\pi/2} \cos^n x dx$. (06 Marks)
- b. Solve $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$. (07 Marks)
- c. A body originally at 80°C cools down to 60°C in 20 minutes in the surroundings of temperature 40°C . Find the temperature of the body after 40 minutes from the original instant. (07 Marks)

Module-5

- 9 a. Find the rank of the matrix
- $$A = \begin{pmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{pmatrix}$$
- by reducing it to echelon form. (06 Marks)
- b. Using the power method find the largest eigenvalue and the corresponding eigenvector of matrix $A = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ taking $(1, 1, 1)^T$ as the initial eigenvector. Perform five iterations. (07 Marks)
- c. Show that the transformation $y_1 = x_1 + 2x_2 + 5x_3$, $y_2 = 2x_1 + 4x_2 + 11x_3$, $y_3 = -x_2 + 2x_3$ is regular. Also, find the inverse transformation. (07 Marks)

OR

- 10 a. Solve the following system of equations by using Gauss-Jordan method:
 $x + y + z = 9$, $x - 2y + 3z = 8$, $2x + y - z = 3$ (06 Marks)
- b. Diagonalize the matrix $A = \begin{pmatrix} -1 & 2 \\ 2 & -1 \end{pmatrix}$. (07 Marks)
- c. Obtain the canonical form of $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ using orthogonal transformation. (07 Marks)

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17PHY12

First Semester B.E. Degree Examination, Dec.2017/Jan.2018 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

Planck's constant, $h = 6.63 \times 10^{-34}$ JS

Mass of electron, $m_e = 9.1 \times 10^{-31}$ kg

Charge of electron, $e = 1.6 \times 10^{-19}$ C

Boltzmann constant = 1.38×10^{-23} JK⁻¹

Avagadro number = 6.02×10^{23} /mol

Module-1

- 1 a. Write the assumptions of Planck's law of radiation. Deduce Wein's law and Rayleigh-Jeans law from Planck's law of radiation. (07 Marks)
- b. Set up time independent one dimensional Schrodinger wave equation. (06 Marks)
- c. What is Compton effect? Explain its physical significance. (03 Marks)
- d. An electron is bound in an one dimensional potential well of width 1 \AA , but if infinite wall height. Find its energy values in the ground state, and also in the first excited states. (04 Marks)

OR

- 2 a. State Heisenberg's uncertainty principle. Show that electrons cannot exist inside the nucleus. (07 Marks)
- b. State de Broglie hypothesis and show that group velocity is equal to particle velocity. (06 Marks)
- c. Briefly explain three properties of wave function. (03 Marks)
- d. Compute the de Broglie wavelength for an electron moving with one tenth part of the velocity of light. (04 Marks)

Module-2

- 3 a. Explain Fermi energy and Fermi factor. Explain the variation of Fermi factor with temperature. (07 Marks)
- b. Derive the expression for electrical conductivity of an intrinsic semiconductor. (05 Marks)
- c. Write a note on Meglave vehicles. (04 Marks)
- d. The electron concentration in a semiconductor is $5 \times 10^{17} \text{ m}^{-3}$. Calculate the conductivity of the material if the drift velocity of electron is 350 ms^{-1} in an electric field of 1000 Vm^{-1} . (04 Marks)

OR

- 4 a. Discuss the merits of quantum free electron theory. (06 Marks)
- b. What is superconductivity? Explain Type-I and Type-II superconductors. (06 Marks)
- c. What is (i) mean collision time, (ii) drift velocity, (iii) Meissner effect? (04 Marks)
- d. Calculate the Fermi velocity and the mean free path for the conduction electrons in silver, given that its Fermi energy is 5.5 eV and the relaxation time for electrons is $3.83 \times 10^{-14} \text{ S}$. (04 Marks)

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Module-3

- 5 a. Define angle of acceptance and numerical aperture. Obtain an expression for the numerical aperture of an optical fiber. (07 Marks)
- b. What is holography? Explain the principle of construction of hologram with suitable ray diagram. (05 Marks)
- c. Explain the processes of spontaneous emission and stimulated emission. (04 Marks)
- d. A medium in thermal equilibrium at temperature 300 K has two energy levels with a wavelength separation of 1 μm . Find the ratio of population densities of the upper and lower levels. (04 Marks)

OR

- 6 a. Describe the construction of CO₂ laser and explain its working with the help of energy level diagram. (06 Marks)
- b. Discuss the three types of optical fibers with suitable diagrams. (06 Marks)
- c. Mention four applications of LASER. (04 Marks)
- d. The angle of acceptance of an optical fiber is 30° when kept in air. Find the angle of acceptance when it is in a medium of refractive index 1.33. (04 Marks)

Module-4

- 7 a. Explain in brief the seven crystal systems with neat diagrams. (07 Marks)
- b. Explain the crystal structure of diamond with neat sketch and calculate its atomic packing factor. (06 Marks)
- c. Define unit cell, primitive cell and Bravais lattice. (03 Marks)
- d. Calculate the glancing angle for incidence of x-rays of wavelength 0.58 Å on the plane (132) of NaCl which results in second order diffraction maxima taking the lattice constant as 3.81 Å. (04 Marks)

OR

- 8 a. What are Miller indices? Derive an expression for interplanar distance in terms of Miller indices. (07 Marks)
- b. Define coordination number and packing factor. Calculate the packing factor for SCC and FCC structure. (06 Marks)
- c. Derive Bragg's law. (04 Marks)
- d. Draw the following planes in a cubic unit cell: i) (1 1 1) ii) (1 0 1) iii) (0 1 1). (03 Marks)

Module-5

- 9 a. Describe the construction and working of Reddy's shock tube. (06 Marks)
- b. Discuss the variation of density of energy states for 3D, 2D, 1D and 0D structures. (06 Marks)
- c. Describe sol-gel method of producing nano particles. (05 Marks)
- d. Mention any three applications of nano particles. (03 Marks)

OR

- 10 a. Describe the principle, construction and working of a scanning electron microscope. (08 Marks)
- b. Define: i) Mach number ii) Subsonic waves
iii) Supersonic waves iv) Ultrasonic waves. (04 Marks)
- c. Explain pyrolysis method of obtaining carbon nanotubes. (04 Marks)
- d. The distance between the two pressure sensors in a shock tube is 100 mm. The time taken by a shock wave to travel this distance is 100 microsecond. If the velocity of sound under the same conditions is 340 ms⁻¹, find the Mach number of the shock wave. (04 Marks)

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17CHE12

First Semester B.E. Degree Examination, Dec.2017/Jan.2018 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 reference electrodes? Describe the construction and working of Calomel electrode, mention the uses. (07 Marks)
- b. Define Battery. Explain construction, working and uses of Ni-metal Hydride battery. (07 Marks)
- c. What are fuel cells? Explain the construction and working of Methanol oxygen cell. (06 Marks)

OR

- 2 a. Define single Electrode Potential? Derive Nernst equation for single electrode. (07 Marks)
- b. What are concentration cells? The cell potential of Ag concentration cell, $\frac{\text{Ag}_{(s)}}{\text{AgNO}_3} (0.001\text{M}) / \text{AgNO}_3 (\text{XM}) / \text{Ag}_{(s)}$ is 0.0659 V at 25°C. Write the cell reactions and calculate the value of X. (07 Marks)
- c. Write a note on: (i) Capacity (ii) Cycle life (iii) Voltage (06 Marks)

Module-2

- 3 a. Define corrosion. Explain electrochemical theory of corrosion by taking Iron as an example. (07 Marks)
- b. What is Anodizing? Explain anodizing of aluminium, mention uses. (07 Marks)
- c. Define Electroless plating. What are the differences between electro plating and electroless plating? (06 Marks)

OR

- 4 a. What is differential aeration corrosion? Explain pitting corrosion with anode and cathode reactions. (07 Marks)
- b. Define metal finishing? Explain electroplating of Nickel by Watt's bath, mention the uses. (07 Marks)
- c. What is cathodic protection? Explain the sacrificial anode method and impressed current method. (06 Marks)

Module-3

- 5 a. Define GCV and NCV? How calorific value of a solid/liquid fuel is determined using bomb calorimeter. (07 Marks)
- b. Define octane and cetane number? What is the objective of reforming of petrol and discuss the various methods of reforming. (07 Marks)
- c. What are solar cells? Describe the method of purification of silicon by zone refining. (06 Marks)

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OR

- 6 a. A coal sample containing 92% C, 7% H₂ and 3% Ash is subjected to combustion in a bomb calorimeter. Calculate the Gross and Net calorific values. Given that mass of coal sample is 0.85×10^{-3} kg, mass of water in copper calorimeter is 2 kg, water equivalent of calorimeter is 0.75 kg, rise in temperature of water is 2.5°C, latent heat of steam is 2454 kJ/kg and specific heat of water is 4.187 kJ/kg°C. (07 Marks)
- b. Describe the production of solar grade Si by union carbide process. (07 Marks)
- c. Explain the construction and working of a PV cell. (06 Marks)

Module-4

- 7 a. What are polymers? Illustrate the mechanism of addition polymerization by taking vinyl chloride as an example. (07 Marks)
- b. Describe the manufacture of, (i) PMMA (ii) Kevlar. Mention the uses. (07 Marks)
- c. Define addition and condensation polymerization process with one example each. (06 Marks)

OR

- 8 a. Define 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) Epoxy resin. (07 Marks)
- c. A polymer sample containing 50, 100 and 150 molecules having molar mass 2000 g/mol, 2500 g/mol and 3000 g/mol respectively. Calculate the number average and weight average molecular mass of polymer. (06 Marks)

Module-5

- 9 a. What is Boiler Feed Water? Explain the differences between scale and sludge formation in boiler. (07 Marks)
- b. What is desalination? Explain the desalination of sea water by electrodialysis. (07 Marks)
- c. What are nano materials? Explain the synthesis of nano material by Sol.gel method. (06 Marks)

OR

- 10 a. Define COD and BOD. In COD test 25.5 cm³ and 12.5 cm³ of 0.05 N FAS solution are required for blank and sample titration respectively. The volume of the test sample used is 26 cm³. Calculate the COD of the sample solution. (08 Marks)
- b. Describe the synthesis of nano materials by chemical vapor condensation process. (06 Marks)
- c. Write a note on CNT and Dendrimers. (06 Marks)

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17CIV13

First Semester B.E. Degree Examination, Dec.2017/Jan.2018 Elements of Civil Engineering & Mechanics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Briefly give the scope of different fields in Civil Engineering. (10 Marks)
- b. List and briefly explain the types of force systems with example. (10 Marks)

OR

- 2 a. Write the classification of roads and comparison of flexible and rigid pavements. (10 Marks)
- b. The moment of certain force 'F' is 180 kN-m clockwise about 'O' and 90kN-m counter clockwise about 'B'. If its moment about 'A' is zero, determine the force 'F'. Refer fig.Q2(b). (10 Marks)

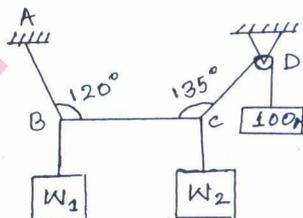
Fig.Q2(b)



Module-2

- 3 a. State and prove Parallelogram law of forces and also write the significance of the law. (10 Marks)
- b. In the fig. Q3(b) the portion BC of the string is horizontal and pulley is frictionless. Determine tensions in different segments of the string. Also find W1 and W2. Use Lami's theorem. (10 Marks)

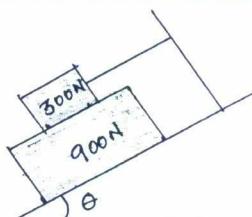
Fig.Q3(b)



OR

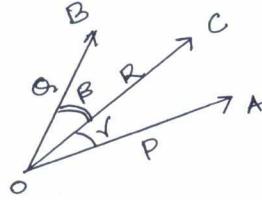
- 4 a. Define the terms : i) Angle of friction ii) Cone of friction. (04 Marks)
- b. What should be the value of θ if fig. Q4(b) which will make the motion of 900N block down the plane to impend? The coefficient of friction for all contact surfaces is $1/3$. (06 Marks)

Fig.Q4(b)



- c. Two forces P & Q are acting at point 'O' as shown in fig. Q4(c). the resultant force is 400N, angles β and γ are 35° and 25° respectively. Find the two forces P and Q. (10 Marks)

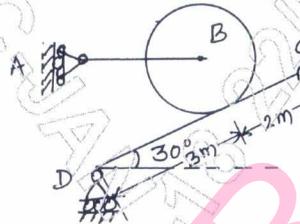
Fig.Q4(c)



Module-3

- 5 a. Explain i) Types of loads ii) Types of support. (10 Marks)
 b. A roller weighing 2000N rests on an inclined bar, which is 5m long and weighing 800N as shown in fig. Q5(b). Determine the reactions developed at supports C and D. (10 Marks)

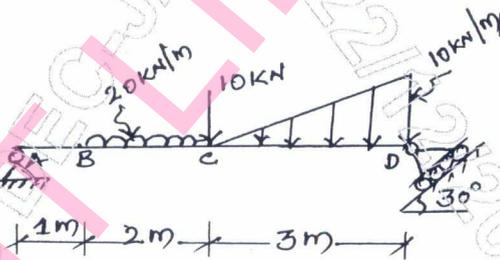
Fig.Q5(b)



OR

- 6 a. State and prove 'Principle of Moments' (10 Marks)
 b. Determine the reactions at the supports for the beam loaded as shown in fig. Q6(b). (10 Marks)

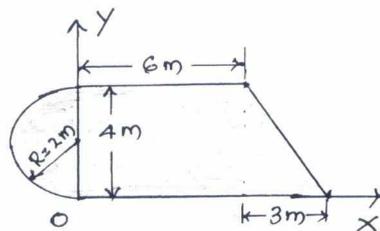
Fig.Q6(b)



Module-4

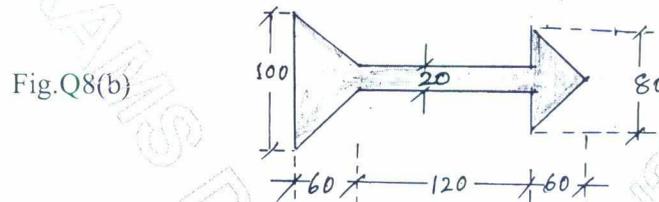
- 7 a. Determine the centroid of a right angle triangle of base 'b' and height 'h' from first principle. (08 Marks)
 b. Determine the centroid of the area shown in fig. Q7(b) with respect to the axes shown. (12 Marks)

Fig.Q7(b)



OR

- 8 a. Determine the moment of Inertia of a circle about its diametral axis by the method of integration. (06 Marks)
- b. Determine the moment of inertia of the section shown in fig. Q8(b) about the Vertical Centroidal axis. All dimensions are in mm. (14 Marks)

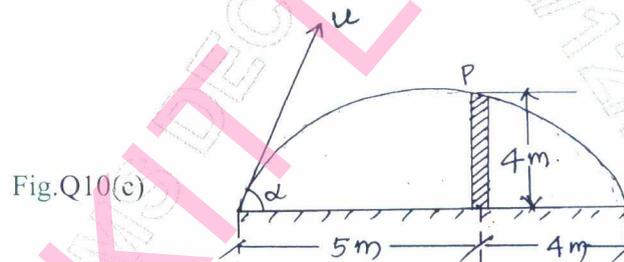


Module-5

- 9 a. State and explain Newton's laws of motion. (10 Marks)
- b. On a straight road, a smuggler's car passes a police station with uniform velocity of 10m/sec. After 10 secs, a police van follows in pursuit with a uniform acceleration of 1m/sec². Find the time necessary for the police van to catch up with the smuggler's car. (10 Marks)

OR

- 10 a. What is Projectile? Define the terms i) Angle of projection ii) Horizontal range. (06 Marks)
- b. Define : i) Centrifugal force ii) Super elevation. (04 Marks)
- c. Find the least initial velocity with which a projectile is to be projected so that it clears a wall of 4m height located at a distance of 5m, and strikes the ground at a distance 4m beyond the wall as shown in fig. Q10(c). The point of projection is at the same level as the foot of the wall. (10 Marks)



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17PCD13

First Semester B.E. Degree Examination, Dec.2017/Jan.2018

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. List all the logical operators and write a C program to demonstrate working of these logical operators. (10 Marks)
- b. Explain structure of C program with an example. (05 Marks)
- c. Classify the following as valid and invalid variable. If invalid give reasons. (05 Marks)
- i) r143
 - ii) help+me
 - iii) auto
 - iv) hello_how
 - v) *a

OR

- 2 a. What is a token? What are different types of tokens available in c language? Explain. (10 Marks)
- b. Write an algorithm and program to find biggest of three numbers. (10 Marks)

Module-2

- 3 a. Write a C program to find the roots of quadratic equation. (10 Marks)
- b. Explain syntax of while statement. Write a C program to check the given number is palindrome or not. (10 Marks)

OR

- 4 a. Explain break and continue statements with respect to do-while, while and for loop with suitable examples. (10 Marks)
- b. Print the following series: (05 Marks)
- ```
1
1 2
1 2 3
1 2 3 4
```
- c. Explain ternary operator with suitable example. (05 Marks)

### Module-3

- 5 a. Define an array. Write a syntax for declaring two dimensional array and initialize the same with suitable example. (10 Marks)
- b. Write a C program to find sum of array elements by passing array as function argument. (05 Marks)
- c. Explain any two string manipulation functions. (05 Marks)

OR

- 6 a. Explain recursion with an example. (06 Marks)
- b. Write a C program to sort the elements of a given array using bubble sort. (08 Marks)
- c. Write a C program to concatenate two strings without using built-in function strcat( ). (06 Marks)

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**Module-4**

- 7 a. What is structure? Explain its declaration and initialization with an example. (06 Marks)  
b. Explain any four file operations with an example. (06 Marks)  
c. Write a C program to pass structure variable as function argument. (08 Marks)

**OR**

- 8 a. Write a C program to store and print Name, USN, SubjectName and IA Marks of student using structure. (10 Marks)  
b. Explain typedef with suitable example. (05 Marks)  
c. Explain how the input is accepted from file and displayed. (05 Marks)

**Module-5**

- 9 a. What is pointer? Give advantages and disadvantages of pointers in C. (07 Marks)  
b. Explain malloc() and calloc() functions with examples. (06 Marks)  
c. What is queue? Explain its operations. (07 Marks)

**OR**

- 10 a. Write a C program to swap two numbers using call by address. (08 Marks)  
b. What are primitive and non-primitive data types and explain. (07 Marks)  
c. Define stack. List applications of stack. (05 Marks)

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17EME14

## First Semester B.E. Degree Examination, Dec.2017/Jan.2018 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Write the differences between Renewable and Non-Renewable energy resources. (06 Marks)  
b. Explain liquid flat plate collector with neat sketch. (06 Marks)  
c. Explain principle of Nuclear power plant with neat sketch. (08 Marks)

OR

- 2 a. Explain the formation of steam with T-H diagram. (08 Marks)  
b. Explain the construction and working of "Lancashire Boiler". (08 Marks)  
c. What are boiler mountings and accessories? List examples of each. (04 Marks)

### Module-2

- 3 a. Explain the De Laval turbine with neat sketch and Pressure-Velocity diagram. (06 Marks)  
b. Explain the open cycle gas turbine with block diagram. (06 Marks)  
c. The following observations were made during a trial run on a four stroke diesel engine:  
Cylinder diameter = 25 cm  
Stroke of the piston = 40 cm  
Crank shaft speed = 250 rpm  
Brake load = 70 kg  
Brake drum diameter = 2 m  
Mean effective pressure = 6 Bar  
Diesel oil consumption = 0.1 litre/min  
Specific gravity of diesel = 0.78  
Calorific value of diesel = 43900 kJ/kg  
Find : (i) Brake power (ii) Indicated power (iii) Friction power (iv) Mechanical efficiency (v) Brake thermal efficiency (vi) Indicated thermal efficiency. (08 Marks)

OR

- 4 a. Explain construction and working of Four stroke SI engine with neat sketch and P-V diagram. (08 Marks)  
b. Explain the working of Pelton wheel with neat sketch. (08 Marks)  
c. Define : (i) Steam turbine (ii) Internal combustion engine. (04 Marks)

### Module-3

- 5 a. Explain the taper turning by swivelling compound tool rest. (06 Marks)  
b. List the various operations performed on drilling machine. Explain with the neat sketches Boring and counterboring operations. (10 Marks)  
c. What is milling? Differentiate drilling and milling operation. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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OR

- 6 a. Define automation and explain the flexible automation. (06 Marks)  
b. Define Robot and write the classification of robot based on physical configuration. Explain the Cartesian co-ordinate robot with neat sketch. (08 Marks)  
c. With the block diagram, explain the basic elements of NC automation system. (06 Marks)

**Module-4**

- 7 a. Write a note on ferrous alloys (any two). (08 Marks)  
b. Define composite material. Mention its applications in aerospace and automation industries. (06 Marks)  
c. Briefly explain types of non-ferrous alloys (any two). (06 Marks)

OR

- 8 a. Explain with neat sketch the arc welding method. (08 Marks)  
b. List the different types of Oxy-acetylene flames and state their applications. (06 Marks)  
c. Define : welding, brazing and soldering. (06 Marks)

**Module-5**

- 9 a. List out the desirable properties of an good refrigerant. (06 Marks)  
b. Explain the principle and working of vapour compression refrigeration with neat sketch. (08 Marks)  
c. Define the following : (i) Refrigeration (ii) Air conditioning (iii) Refrigerant (06 Marks)

OR

- 10 a. Explain with a neat sketch, working of room air conditioner. (08 Marks)  
b. What are the differences between vapour compression and absorption systems? (08 Marks)  
c. List out refrigerants commonly used in practice. (04 Marks)

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# CBCS Scheme

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17EME14

## First Semester B.E. Degree Examination, Dec.2017/Jan.2018 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Write the differences between Renewable and Non-Renewable energy resources. (06 Marks)  
b. Explain liquid flat plate collector with neat sketch. (06 Marks)  
c. Explain principle of Nuclear power plant with neat sketch. (08 Marks)

OR

- 2 a. Explain the formation of steam with T-H diagram. (08 Marks)  
b. Explain the construction and working of "Lancashire Boiler". (08 Marks)  
c. What are boiler mountings and accessories? List examples of each. (04 Marks)

### Module-2

- 3 a. Explain the De Laval turbine with neat sketch and Pressure-Velocity diagram. (06 Marks)  
b. Explain the open cycle gas turbine with block diagram. (06 Marks)  
c. The following observations were made during a trial run on a four stroke diesel engine:  
Cylinder diameter = 25 cm  
Stroke of the piston = 40 cm  
Crank shaft speed = 250 rpm  
Brake load = 70 kg  
Brake drum diameter = 2 m  
Mean effective pressure = 6 Bar  
Diesel oil consumption = 0.1 litre/min  
Specific gravity of diesel = 0.78  
Calorific value of diesel = 43900 kJ/kg  
Find : (i) Brake power (ii) Indicated power (iii) Friction power (iv) Mechanical efficiency (v) Brake thermal efficiency (vi) Indicated thermal efficiency. (08 Marks)

OR

- 4 a. Explain construction and working of Four stroke SI engine with neat sketch and P-V diagram. (08 Marks)  
b. Explain the working of Pelton wheel with neat sketch. (08 Marks)  
c. Define : (i) Steam turbine (ii) Internal combustion engine. (04 Marks)

### Module-3

- 5 a. Explain the taper turning by swivelling compound tool rest. (06 Marks)  
b. List the various operations performed on drilling machine. Explain with the neat sketches Boring and counterboring operations. (10 Marks)  
c. What is milling? Differentiate drilling and milling operation. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Define automation and explain the flexible automation. (06 Marks)  
b. Define Robot and write the classification of robot based on physical configuration. Explain the Cartesian co-ordinate robot with neat sketch. (08 Marks)  
c. With the block diagram, explain the basic elements of NC automation system. (06 Marks)

**Module-4**

- 7 a. Write a note on ferrous alloys (any two). (08 Marks)  
b. Define composite material. Mention its applications in aerospace and automation industries. (06 Marks)  
c. Briefly explain types of non-ferrous alloys (any two). (06 Marks)

OR

- 8 a. Explain with neat sketch the arc welding method. (08 Marks)  
b. List the different types of Oxy-acetylene flames and state their applications. (06 Marks)  
c. Define : welding, brazing and soldering. (06 Marks)

**Module-5**

- 9 a. List out the desirable properties of an good refrigerant. (06 Marks)  
b. Explain the principle and working of vapour compression refrigeration with neat sketch. (08 Marks)  
c. Define the following : (i) Refrigeration (ii) Air conditioning (iii) Refrigerant (06 Marks)

OR

- 10 a. Explain with a neat sketch, working of room air conditioner. (08 Marks)  
b. What are the differences between vapour compression and absorption systems? (08 Marks)  
c. List out refrigerants commonly used in practice. (04 Marks)

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# CBCS Scheme

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17ELN15

First Semester B.E. Degree Examination, Dec.2017/Jan.2018

## 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 biased conditions, with the help of VI characteristics curve. (06 Marks)
- b. Derive the relation between  $\alpha$  and  $\beta$ . Calculate  $I_C$  and  $I_E$  for transistor that has  $\alpha_{dc} = 0.98$  and  $I_B = 100 \mu A$ . (06 Marks)
- c. With a neat circuit diagram and waveforms, explain the working of centre-tap full wave rectifier and derive the efficiency for the same. (08 Marks)

OR

- 2 a. With a neat diagram, explain the operation of PNP and NPN transistor. (08 Marks)
- b. A half wave rectifier from a supply 230 V 50 Hz with step down transformer ratio 3:1 to a resistive load of 10 K $\Omega$ . The diode forward resistance is 75  $\Omega$  and transformer secondary is 10  $\Omega$ . Calculate the DC current, DC voltage, efficiency and ripple factor. (06 Marks)
- c. With neat circuit diagram, explain the common emitter circuit and sketch the input and output characteristics. (06 Marks)

### Module-2

- 3 a. With a necessary equation and circuit, explain the base-bias transistor circuits. (06 Marks)
- b. Design an Adder using op-amp to give the output voltage,  
 $V_0 = -[2V_1 + 3V_2 + 5V_3]$  (06 Marks)
- c. Derive the equations for output voltage for an inverting amplifier and an integrator. (08 Marks)

OR

- 4 a. Explain the characteristics of an ideal op-amp. Mention the applications. (06 Marks)
- b. Accurately analyze the voltage divider bias which has  $V_{CC} = 18 V$ ,  $R_1 = 33 K\Omega$ ,  $R_2 = 12 K\Omega$  and  $R_E = 1 K\Omega$ . Determine  $V_E$ ,  $V_C$ ,  $V_{CE}$ ,  $I_C$  and Q point, when transistor  $h_{fe} = 200$ . (08 Marks)
- c. Write short notes on op-amp virtual ground concept. (06 Marks)

### Module-3

- 5 a. Perform the following:
  - i) Convert  $(57345)_{10} = ( )_{16}$
  - ii) Subtract  $(28)_{10} - (19)_{10}$  using 2's complement method. (06 Marks)
- b. Realize  $Y = AB + CD + E$  using NAND gate. (06 Marks)
- c. Explain the full adder circuit with truth table. Realize the circuit for sum and carry using logic gates. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Perform the following:
- Convert  $(FA27D)_{16} = ( )_2 \rightarrow = ( )_8 = ( )_{10}$
  - Subtract  $10.0101 - 101.1110$  using 1's complement method. (06 Marks)
- b.  $Y = A + AB + ABC$  simplify and implement using logic gates and NOR gates. (06 Marks)
- c. State and prove De Morgan's theorem using two variable. (08 Marks)

**Module-4**

- 7 a. Bring out differences between flip flops and latches. (04 Marks)
- b. Explain SR flipflop with circuit diagram and truth table. (06 Marks)
- c. With a neat block diagram explain the architecture of 8051 microcontroller. (10 Marks)

OR

- 8 a. Explain the operation of NAND gate latch with circuit and truth table. (10 Marks)
- b. What is stepper motor? With a neat block diagram, explain the working principle of microcontroller based stepper motor control system. (10 Marks)

**Module-5**

- 9 a. Define communication. With neat block diagram, explain the elements of communication system. (06 Marks)
- b. Derive an expression for amplitude modulation and draw the necessary waveforms. (08 Marks)
- c. What is transducer? Compare the active and passive transducers. (06 Marks)

OR

- 10 a. Bring out the difference between amplitude modulation and frequency modulation. (06 Marks)
- b. If a FM wave represented by the equation  $V = 10\sin(8 \times 10^8 + 4\sin 1000t)$ , calculate:
- Carrier frequency
  - Modulating frequency
  - Modulation index
  - Band width
- (06 Marks)
- c. With necessary diagram and equations, explain the following:
- Piezo-electric transducer
  - LVDT. (08 Marks)

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# CBCS Scheme

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17CIV18

Question Paper Version : B

First Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Environmental Studies

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 30

### INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries **ONE mark**.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

- 
1. In water treatment, alum is used for  
a) Softening                      b) Coagulation                      c) Filtration                      d) Disinfection
  2. World Ozone day is being celebrated on  
a) September 5<sup>th</sup>                      b) October 15<sup>th</sup>                      c) September 11<sup>th</sup>                      d) September 16<sup>th</sup>
  3. Acid rain has been increasing day by day due to  
a) Urbanisation                      b) Industrialization                      c) Increase in vehicle population                      d) None of these
  4. Reduction in brightness of the famous Taj Mahal is due to  
a) Global warming                      b) Air pollution                      c) Ozone depletion                      d) Afforestation
  5. Primary cause of Acid rain around the World is due to  
a) Carbon-di-oxide                      b) Sulphur-di-oxide                      c) Carbon-Monoxide                      d) Ozone
  6. Petroleum based vehicles emit tracer of  
a) CO & NO<sub>2</sub>                      b) SPM                      c) Aldehydes                      d) CH<sub>n</sub>
  7. Definition of Noise is  
a) Loud sound                      b) Unwanted sound  
c) Constant sound                      d) Sound on high frequency

8. Smog is  
 a) A natural phenomenon  
 b) Combination of smoke & fog  
 c) Colourless  
 d) All the above
9. The liquid waste from kitchen and bathroom is called  
 a) Sullage  
 b) Domestic sewage  
 c) Storm waste  
 d) Run off
10. BOD means  
 a) Bio chemical oxygen demand  
 b) Chemical oxygen demand  
 c) Bio – physical oxygen demand  
 d) All the above
11. Highest producer of oil and petroleum is  
 a) Middle East countries  
 b) America  
 c) China  
 d) India
12. Nuclear waste is active for  
 a) 5 year  
 b) 10 years  
 c) 50 years  
 d) Centuries
13. Nuclear power plant in Karnataka is located at  
 a) Bhadravathi  
 b) Sondur  
 c) Raichur  
 d) Kaiga
14. Direct conversion of solar energy is attained by  
 a) Solar photo voltaic system  
 b) Solar diesel hybrid system  
 c) Solar thermal system  
 d) Solar air heater
15. India has the largest share of which of the following  
 a) Manganese  
 b) Mica  
 c) Copper  
 d) Diamond
16. Forests prevent soil erosion by binding soil particles in their  
 a) Stems  
 b) Roots  
 c) Leaves  
 d) Buds
17. Which of the following is the most environmental friendly agriculture practice  
 a) using chemical fertilizers  
 b) using insecticides  
 c) organic farming  
 d) None of these
18. Mining means  
 a) To conserve minerals  
 b) To check pollution  
 c) To extract minerals and ores  
 d) None of these
19. Which of the following is absorbed by green plants from atmosphere  
 a) Carbon –di- oxide  
 b) Water  
 c) Nutrients  
 d) All of the above
20. Which atmospheric sphere is closest to earth surface  
 a) Troposphere  
 b) Stratosphere  
 c) Mesosphere  
 d) Exosphere
21. The largest reservoir of Nitrogen in our plant is  
 a) Oceans  
 b) Atmosphere  
 c) Biosphere  
 d) Fossil fuels

22. In an Ecosystem, the flow of energy is  
a) Bidirectional      b) Cyclic      c) Unidirectional      d) Multidirectional
23. Which of the following conceptual spheres of the environment is having the least storage capacity for matter  
a) Atmosphere      b) Lithosphere      c) Hydrosphere      d) Biosphere
24. The term Environment has been derived from the French word \_\_\_\_\_ which means to encircle or surround.  
a) Environ      b) Oikes      c) Geo      d) Aqua
25. Remote sensing technique deals with the detection of recording of a selected portion of  
a) Emission spectrum      b) Light spectrum  
c) Photo spectrum      d) Electro magnetic spectrum
26. RADAR stands for  
a) Radio & Distance Ranging      b) Radio detection & Ranging  
c) Ranging & Detection Arrangement      d) Radio detection Recorder
27. Which is not a commonly using coding scheme for images  
a) JPEG      b) Gif      c) MP3      d) Tiff
28. DBMS stands for  
a) Database Management System      b) Database Monitoring system  
c) Database Manufacturing system      d) Database Mixing station
29. GIS stands for  
a) Geostationary interact sector      b) Geographical information system  
c) Geotechnical information society      d) Geothermal investigation site
30. Which State is having highest women literacy rate in India  
a) Karnataka      b) Punjab      c) Rajasthan      d) Kerala

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