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QUESTION PAPERS

I AND IInd SEMESTER ALL BRANCHES

DEC 2017/JAN 2018

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CBCS Scheme

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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)

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 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 electro dialysis. (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)

CBCS Scheme

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17CIV18

Question Paper Version : C

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. Smog is
a) A natural phenomenon
b) Combination of smoke & fog
c) Colourless
d) All the above
 2. The liquid waste from kitchen and bathroom is called
a) Sullage
b) Domestic sewage
c) Storm waste
d) Run off
 3. BOD means
a) Bio chemical oxygen demand
b) Chemical oxygen demand
c) Bio – physical oxygen demand
d) All the above
 4. Highest producer of oil and petroleum is
a) Middle East countries
b) America
c) China
d) India
 5. Nuclear waste is active for
a) 5 year
b) 10 years
c) 50 years
d) Centuries
 6. Nuclear power plant in Karnataka is located at
a) Bhadravathi
b) Sondur
c) Raichur
d) Kaiga

7. 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
8. India has the largest share of which of the following
a) Manganese b) Mica c) Copper d) Diamond
9. Forests prevent soil erosion by binding soil particles in their
a) Stems b) Roots c) Leaves d) Buds
10. 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
11. Mining means
a) To conserve minerals b) To check pollution
c) To extract minerals and ores d) None of these
12. Which of the following is absorbed by green plants from atmosphere
a) Carbon -di - oxide b) Water c) Nutrients d) All of the above
13. Which atmospheric sphere is closest to earth surface
a) Troposphere b) Stratosphere c) Mesosphere d) Exosphere
14. The largest reservoir of Nitrogen in our plant is
a) Oceans b) Atmosphere c) Biosphere d) Fossil fuels
15. In an Ecosystem, the flow of energy is
a) Bidirectional b) Cyclic c) Unidirectional d) Multidirectional
16. 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
17. The term Environment has been derived from the French word _____ which means to encircle or surround.
a) Environ b) Oikes c) Geo d) Aqua
18. 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
19. RADAR stands for
a) Radio & Distance Ranging b) Radio detection & Ranging
c) Ranging & Detection Arrangement d) Radio detection Recorder

20. Which is not a commonly using coding scheme for images
a) JPEG b) Gif c) MP3 d) Tiff
21. DBMS stands for
a) Database Management System b) Database Monitoring system
c) Database Manufacturing system d) Database Mixing station
22. GIS stands for
a) Geostationary interact sector b) Geographical information system
c) Geotechnical information society d) Geothermal investigation site
23. Which State is having highest women literacy rate in India
a) Karnataka b) Punjab c) Rajasthan d) Kerala
24. In water treatment, alum is used for
a) Softening b) Coagulation c) Filtration d) Disinfection
25. World Ozone day is being celebrated on
a) September 5th b) October 15th c) September 11th d) September 16th
26. Acid rain has been increasing day by day due to
a) Urbanisation b) Industrialization
c) Increase in vehicle population d) None of these
27. Reduction in brightness of the famous Taj Mahal is due to
a) Global warming b) Air pollution c) Ozone depletion d) Afforestation
28. Primary cause of Acid rain around the World is due to
a) Carbon-di-oxide b) Sulphur-di- xide c) Carbon-Monoxide d) Ozone
29. Petroleum based vehicles emit tracer of
a) CO & NO₂ b) SPM c) Aldehydes d) CH_n
30. Definition of Noise is
a) Loud sound b) Unwanted sound
c) Constant sound d) Sound on high frequency

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CBCS Scheme

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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

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

OR

- Write the classification of roads and comparison of flexible and rigid pavements. (10 Marks)
 - 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)

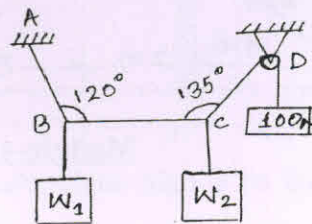
Fig.Q2(b)



Module-2

- State and prove Parallelogram law of forces and also write the significance of the law. (10 Marks)
 - 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)

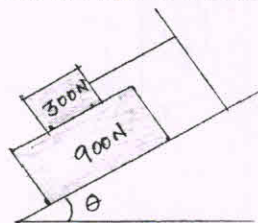
Fig.Q3(b)



OR

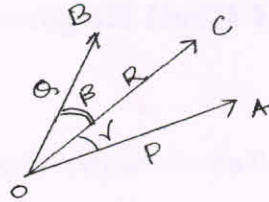
- Define the terms : i) Angle of friction ii) Cone of friction. (04 Marks)
 - What should be the value of θ if fig. Q4(b) which will make the motion of 900N block down the plane to impend? The coefficient of friction for all contact surfaces is $1/3$. (06 Marks)

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)

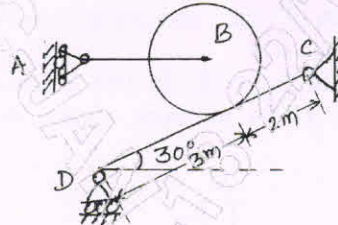
Fig.Q4(c)



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)

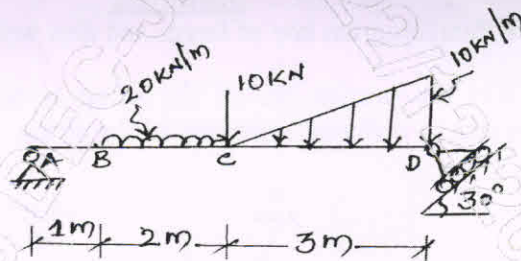
Fig.Q5(b)



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)

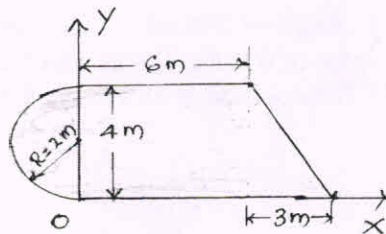
Fig.Q6(b)



Module-4

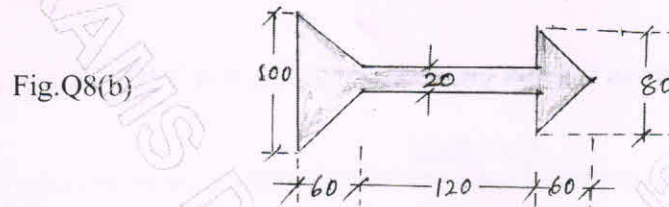
- 7 a. Determine the centroid of a right angle triangle of base 'b' and height 'h' from first principle. (08 Marks)
 b. Determine the centroid of the area shown in fig. Q7(b) with respect to the axes shown. (12 Marks)

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)

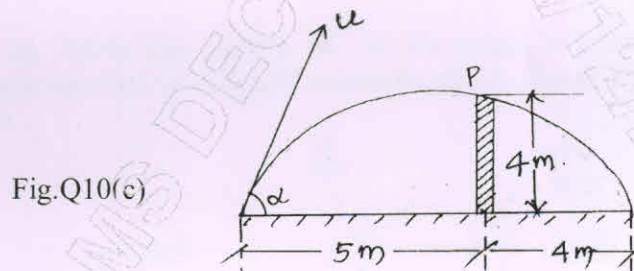


Module-5

- 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/sec^2 . 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)



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 α and β . 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 Ω . The diode forward resistance is 75 Ω and transformer secondary is 10 Ω . 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,
 $V_o = -[2V_1 + 3V_2 + 5V_3]$ (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 Ω , $R_2 = 12$ K Ω and $R_E = 1$ K Ω . 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. $Y = A + \bar{A}B + ABC$ 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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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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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 $\lim_{x \rightarrow 0} \left(\frac{a^x + b^x + c^x}{3} \right)^{1/x}$. (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)

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)

CBCS Scheme

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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)

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.

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)

CBCS Scheme

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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 3.83×10^{-14} S. (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.

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 $1 \mu\text{m}$. Find the ratio of population densities of the upper and lower levels. (04 Marks)

OR

- 6 a. Describe the construction of CO_2 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 \AA on the plane (132) of NaCl which results in second order diffraction maxima taking the lattice constant as 3.81 \AA . (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 $\bar{1}$ 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)

* * * * *

- b. What is numerical aperture? Obtain an expression for numerical aperture in terms of refractive indices of core and cladding. (06 Marks)
- c. The attenuation of light in an optical fiber is 3.6dB/km, what fraction of its initial intensity remains after i) 1km ii) 3km ? (04 Marks)

Module-4

- 7 a. What are Miller indices? Derive the expression for the interplanar spacing in terms of Miller indices. (06 Marks)
- b. Describe the construction and working of Bragg's X-ray spectrometer. (06 Marks)
- c. First order Bragg reflection occurs when a monochromatic beam of X-rays of wavelength 0.675\AA is incident on a crystal at a glancing angle of $4^{\circ}51'$. What is the glancing angle for third order Bragg reflection to occur? (04 Marks)

OR

- 8 a. Define coordination number and atomic packing factor. Calculate the coordination number for sc, bcc and fcc structures. (07 Marks)
- b. Derive Bragg's law. (05 Marks)
- c. Draw the crystal planes (100) (200) (001) and (011) in a cubic unit cell. (04 Marks)

Module-5

- 9 a. What is Mach number? Distinguish between acoustic, ultrasonic, subsonic and supersonic waves. (05 Marks)
- b. What are nanomaterials? Explain the Sol – Gel method of synthesis of nano-materials. (07 Marks)
- c. In a scanning electron microscope, electrons are accelerated by an anode potential difference of 60kV. Estimate the wavelength of the electron in the scanning beam. (04 Marks)

OR

- 10 a. What is a shock wave? Describe the construction and working of Reddy's shock tube. (07 Marks)
- b. What is a carbon nano tube? Explain how it is synthesized using pyrolysis method. (05 Marks)
- c. Mention the principle and three applications of SEM. (04 Marks)

CBCS Scheme

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15CHE12/22

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

Engineering Chemistry

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is an ion selective electrode? Explain the method of determining the pH of a solution using glass electrode. (06 Marks)
- b. Discuss the construction and working of Zinc – air battery. (05 Marks)
- c. What are fuel cells? How it is different from a galvanic cell? Mention any two advantages of fuel cells. (05 Marks)

OR

- 2 a. Describe the construction and working principle of glass electrode. (06 Marks)
- b. Explain the construction and working of Ni – metal hydride batteries. (06 Marks)
- c. What are concentration cells? The emf of the cell $\text{Cu} | \text{CuSO}_4 (0.01\text{M}) || \text{CuSO}_4 (\text{XM}) | \text{Cu}$ is 0.0295V at 25°C. Find the value of X. (04 Marks)

Module-2

- 3 a. Define corrosion. Explain electrochemical theory of corrosion. (06 Marks)
- b. What is Anodization? Explain anodization of aluminium. (06 Marks)
- c. Mention the difference between electroplating and electroless plating. (04 Marks)

OR

- 4 a. Write a note on polarization and over potential. (06 Marks)
- b. What is galvanization? Describe the galvanization process for iron. (05 Marks)
- c. Explain the process of electroplating of hard chromium. (05 Marks)

Module-3

- 5 a. Define calorific value. Explain how calorific value of solid fuel is determined by bomb calorimeter. (07 Marks)
- b. Explain the synthesis of petrol by Fischer – Tropsch process. (05 Marks)
- c. Write the advantages and disadvantages of PV cells. (04 Marks)

OR

- 6 a. What is knocking in IC engines? Explain its mechanism with chemical reactions. (06 Marks)
- b. Explain the modules, panels and arrays of PV cells. (06 Marks)
- c. What is reforming of petroleum? Give any three reactions involved in reformation. (04 Marks)

Module-4

- 7 a. What are conducting polymers? Discuss the conduction mechanism in polyaniline and mention any two applications. (07 Marks)
- b. What is glass transition temperature? Explain any 3 factors influencing Tg values. (05 Marks)
- c. Explain the synthesis and applications of silicon rubber. (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

- 8 a. A polymer has the following composition 100 molecules of molecular mass 1000g/mol, 200 molecules of molecular mass 2000g/mol and 500 molecules of molecular mass 5000g/mol. Calculate the number and weight average molecular weight. (06 Marks)
- b. Explain the synthesis and applications of : i) PMMA and ii) Epoxy resin. (06 Marks)
- c. Distinguish between addition and condensation polymerization with example. (04 Marks)

Module-5

- 9 a. Define COD. Discuss the experimental determination of COD of waste water. (06 Marks)
- b. Define desalination. Explain desalination of sea water by electro dialysis process. (06 Marks)
- c. Write a note on carbon nano tubes. Mention its applications. (04 Marks)

OR

- 10 a. Discuss the boiler corrosion due to O_2 , CO_2 and $MgCl_2$ and its control. (07 Marks)
- b. Explain the synthesis of nano materials by sol-gel process. (05 Marks)
- c. Write a note on priming and foaming. (04 Marks)

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OR

Module-6

CBCS Scheme

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15CIV13/23

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

Time: 3 hrs.

Max. Marks:80

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

Module-1

- 1 a. Name different fields of civil engineering and explain any two of them. (06 Marks)
- b. With neat sketch, explain any two types of dams. (06 Marks)
- c. Find the moment of 500N force about points A, B, C and D as shown in Fig.Q1(C). (04 Marks)

OR

- 2 a. Explain the role of civil engineer in infrastructural development of the country. (06 Marks)
- b. Explain the Nagpur road plan classification. (06 Marks)
- c. A square ABCD has forces acting along its sides as shown in Fig.Q2(c). Find the value of P and Q, if the system reduces to a couple. Also find magnitude of the couple if the side of the square is 2m. (04 Marks)

Module-2

- 3 a. State and prove parallelogram law of forces. (06 Marks)
- b. The forces acting on the system are shown in Fig.Q2(b). Determine the magnitude and direction of the resultants. (06 Marks)
- c. With neat sketches explain angle of friction, angle of repose and cone of friction. (04 Marks)

OR

- 4 a. State laws of dry friction. (04 Marks)
- b. A chord supported at A and B carries a load of 100kN at D and a load of W at C as shown in Fig.Q4(b). Find the values of W so that CD remains horizontal. Also determine tension in each chord. (06 Marks)
- c. A block weighing 4000N is resting on horizontal surface supports another block of 2000N as shown in Fig.Q4(c). Find the horizontal force F just to move the block to the left. Take coefficient of friction for all surfaces of contact to be 0.2. (06 Marks)

Module-3

- 5 a. State and prove Varignon's principle of moments. (06 Marks)
- b. A rigid plate is subjected to the forces as shown in Fig.Q5(b). Compute magnitude direction and position of resultant force with respect to centroid point O of the plate. (06 Marks)
- c. Determine the support reactions for the beam shown in Fig.Q5(c). (04 Marks)

OR

- 6 a. With neat sketches indicating the reactions explain types of supports. (04 Marks)
 b. The forces acting on 1m length of a dam are as shown in Fig.Q6(b). Determine the magnitude, direction and position of resultant from O. (06 Marks)
 c. A uniform beam AB hinged at A, is kept horizontal by supporting and settling a 400kN with the help of a rope tied at B and passing over smooth pulley at C. The bar weights 200kN. Determine the reactions at the supports A and C as well as the tension in the string. Refer Fig.Q6(c). (06 Marks)

Module-4

- 7 a. State and prove parallel axis theorem. (05 Marks)
 b. From first principles determine the centroid of a rectangle. (05 Marks)
 c. Determine the centroid of the area shown in Fig.A7(c) with respect to the axis shown. (06 Marks)

OR

- 8 a. From first principles determine the centroid of quarter circle. (06 Marks)
 b. Determine the moment of inertia of the symmetric I section shown in Fig.Q8(b) about its centroidal x – x axis and y – y axis. Also determine polar moment of inertia. (10 Marks)

Module-5

- 9 a. Derive the expression for maximum height attained by the projectile. (05 Marks)
 b. A car starts from rest and accelerates uniformly to a speed of 75 kmph over a distance of 1000M. Find acceleration of the car and time taken to attain this speed. If a further acceleration rises the speed to 100kmph in 10sec, find the new acceleration and the further distance moved. (05 Marks)
 c. The equation of motion of particle is given by $a = 4t^3 - 3t^2 + 6$ where a : acceleration in m/sec^2 and t : time in seconds. The velocity of the particle at $t = 1$ second is 5.0 m/sec and displacement is 10m. Determine the displacement and velocity at $t = 5$ seconds. (06 Marks)

OR

- 10 a. What is super elevation? Explain the objects of providing super elevation. (04 Marks)
 b. A ball was thrown vertically upwards from the ground with the velocity of 60m/sec. After 3 seconds another ball was thrown vertically upwards from the ground. If both the balls strike the ground at the same time, determine the velocity with which the second ball was thrown. (06 Marks)
 c. A particle is projected in air with a velocity of 120m/sec at an angle of 30° with the horizontal. Determine :
 i) The horizontal range
 ii) Maximum height attained by the particle
 iii) The time of flight. (06 Marks)

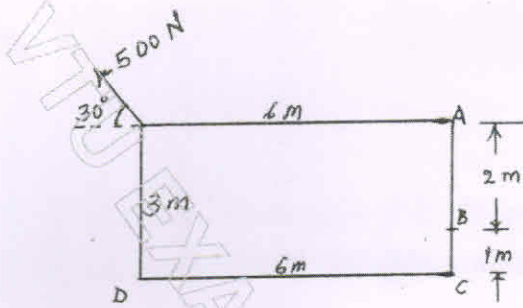


Fig.Q1(c)

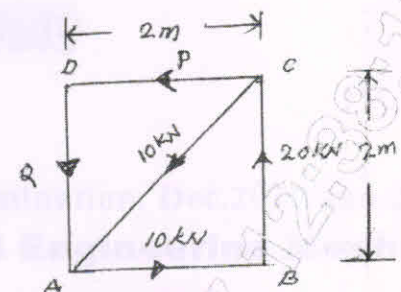


Fig.Q2(c)

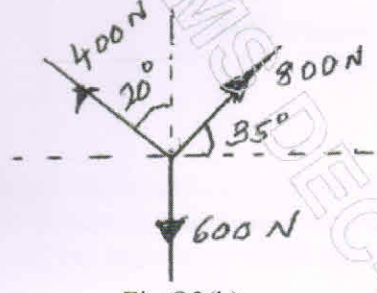


Fig.Q3(b)

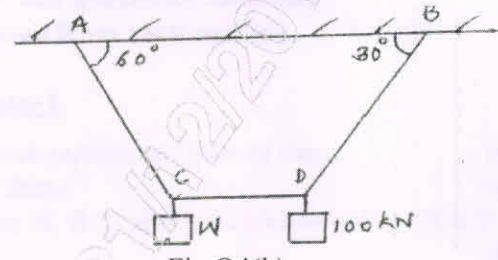


Fig.Q4(b)

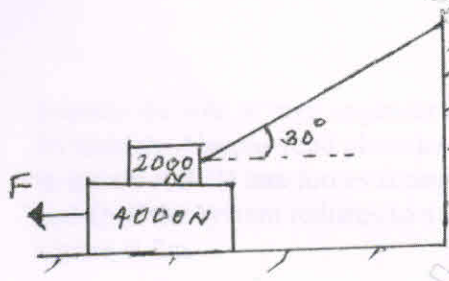


Fig.Q4(c)

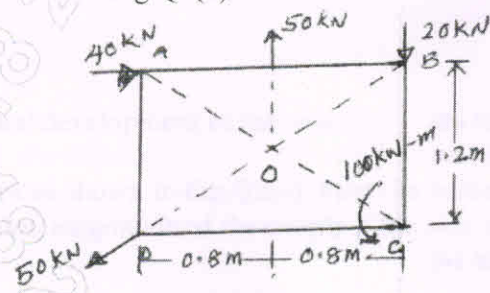


Fig.Q5(b)

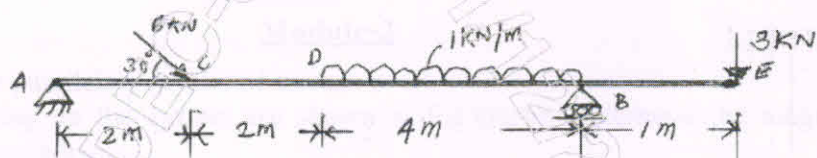


Fig.Q5(C)

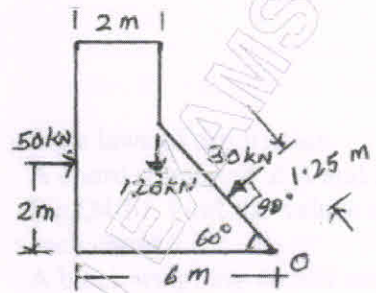


Fig.Q6(b)

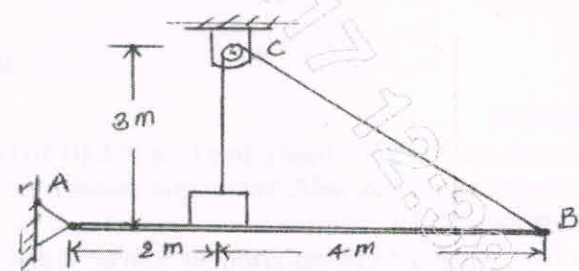


Fig.Q6(c)

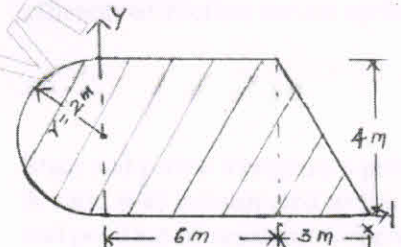


Fig.Q7(c)

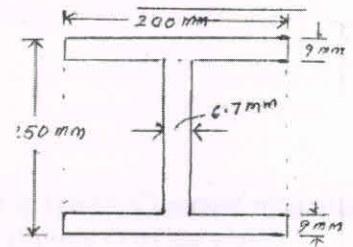


Fig.Q8(b)

CBCS Scheme

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

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the forty 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. The objective of environmental education is
 - a) Raise consciousness about environmental conditions
 - b) To teach environmentally appropriate behaviour
 - c) Create an environmental ethic
 - d) All of the above.
2. Which of the following is a biotic component of an ecosystem?

a) Fungi	b) Solar light	c) Temperature	d) humidity.
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3. In complex ecosystems the degree of species diversity is

a) Poor	b) High	c) Medium	d) None.
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4. Which of the following statement is false
 - a) Inorganic nutrients are recycled in an ecosystem
 - b) Energy "flows" through the ecosystem in the form of carbon-carbon bonds
 - c) Energy is recycled in an ecosystem
 - d) Respiration process releases energy.
5. In an ecosystem biological cycling of materials is maintained by

a) Procedure	b) Consumer	c) Decomposer	d) All of the above.
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6. A predator is
a) An animal that is fed upon
b) An animal that feeds upon another animal
c) Animal that feeds upon both plants and animals
d) A primary consumer.
7. Ozone concentration is relatively more in
a) Mesosphere b) Stratosphere c) Staticsphere d) Atmosphere.
8. World environmental day is on
a) 5th May b) 5th June c) 15th June d) 15th May.
9. EIA can be expanded as
a) Environment of Industrial Act b) Environment Important Act
c) Environment Impact Assessment d) Economic Industrial Act.
10. Major purpose of most of the dams are
a) Power generation b) Drinking c) Flood control d) Irrigation.
11. Eutrophication is related to
a) Water b) Soil c) Air d) Land.
12. Water logging is effect of modern
a) Industries b) Agriculture c) Population d) Education.
13. Bioremediation means removal of contaminates by
a) Mining b) Super bugs c) Air d) Water.
14. Nitrate contamination causes
a) White baby syndrom b) Blue baby syndrom
c) Green baby syndrom d) Black baby syndrom.
15. Out of the following nutrients in fertilizers which one causes minimum water pollution
a) Nitrogen b) Phosphorous c) Potassium d) Organic matter.
16. Fluorosis is caused due to
a) Chlorine b) Fluoride c) Feldspar d) Farming.
17. Hepatitis is caused by
a) Hepata worm b) Virus c) Amoeba d) Fungus.
18. Chernobyl disaster occurred in the year
a) 1986 b) 2006 c) 2011 d) 1947.

19. Fukushima disaster is a
a) Heavy metal disaster
b) Nuclear disaster
c) Atom bomb disaster
d) Pesticide disaster.
20. A country without a single nuclear power plant is
a) China
b) USA
c) Australia
d) France.
21. Which of the following is more ecofriendly source of producing energy
a) Biogas
b) Coal
c) Fuel cells
d) Hydel
22. Electromagnetic radiation can cause
a) Plague
b) Dengue
c) Cancer
d) Malaria.
23. Wind farms are located in
a) River basin
b) Plain areas
c) Hilly areas
d) Forest areas.
24. Natural gas contains
a) Methane
b) Oxygen
c) Nitrogen
d) Sulphur.
25. The source of electromagnetic radiation is
a) Magnetics
b) Electrons
c) Sun
d) Earth.
26. Which of the following sources is surface water
a) Springs
b) Streams
c) Wells
d) all.
27. Which of the following is an air pollutant
a) CO
b) O₂
c) N₂
d) all.
28. Smog in London was due to
a) SO₂ and NO₂
b) CO₂ and CO
c) Methane and ethane
d) Water and air.
29. Which of the following are Non-biodegradable
a) Plastics
b) Domestic sewage
c) Detergent
d) a and c
30. Endosulfan is a
a) Organization
b) Institution
c) Pesticide
d) River
31. Minamata disease is caused due to
a) Lead
b) Copper
c) Mercury
d) Arsenic.
32. World's single largest class of refugees is due to
a) War
b) Earthquake
c) Tsunami
d) Environmental degradation.

33. Noise pollution limits at airport area
a) 65dB b) 120dB c) 240dB d) 600dB.
34. Blaring sounds are known to cause
a) Metal distress b) Deafness
c) Neurological problems d) All the above.
35. Increase in asthma attacks has been linked to high levels of
a) Soil borne pesticides b) Air borne dust portsides
c) CO₂ d) Green house gases.
36. Population explosion will cause
a) Biodiversity b) Stress on the ecosystem
c) Better communication d) Energy storage.
37. The Protocol that reduces green house gas emissions are
a) Kyoto protocol b) Cartagena protocol
c) Montreal Protocol d) Delhi protocol.
38. Global warming could affect
a) Climate b) Increase in sea level c) Melting of glaciers d) All of the above.
39. Primary cause of acid rain around the world is due to
a) CO₂ b) CO c) SO₂ d) O₃.
40. Reduction in brightness and the famous Taj Mahal is due to
a) Global warming b) Green house gases
c) Ozone deflection d) Air pollution.

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CBCS Scheme

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

Constitution of India, Professional Ethics & Human Rights

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the forty 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. The Governor of the state is
a) Directly elected by the people
b) Elected by the state legislature
c) Appointed by the president
d) Nominated by the parliament
 2. The ordinances issued by the state governor are subject to approval by
a) The president of India
b) Chief minister of the state
c) Union parliament
d) State legislature concerned
 3. High court judges retire at the age of
a) 65 years
b) 63 years
c) 60 years
d) 62 years
 4. The executive of the state government comprises of
a) President, governor and chief minister
b) Governor and chief minister
c) Governor and council of ministers
d) Chief minister and council of ministers
 5. When a state assembly is dissolved, the law making power for the state concerned rests with the
a) State governor
b) Union parliament
c) President of India
d) Chief justice of India
 6. The total members in the legislature council should not be less than,
a) 250
b) 80
c) 20
d) 40

7. The number of council of ministers including the chief minister shall not exceed the total number of MLAs
 a) 25% b) 30% c) 15% d) 20%
8. To become a judge of the high court one must be a practicing advocate of high court for at least
 a) 10 years b) 20 years c) 15 years d) 5 years
9. Judicial activism is
 a) For curtailment of the power of the government
 b) For the protection of the rights of the citizens
 c) For the curtailment of the active organization
 d) For the follow up of the court directions
10. Practices derogatory to the status of women is renounced under
 a) Article 51(A)(e) b) Article 32(c)
 c) Article 51 d) None of these
11. Proclamation of national emergency must be approved within
 a) 2 months b) 1 month c) 6 months d) 1 year
12. State emergency is also called as
 a) President's rule b) Prime minister's rule
 c) Governor's rule d) Chief justice's rule
13. The removal of chief election, commissioner may be on the grounds similar to that of
 a) Judge of a high court b) Judge of a supreme court
 c) Attorney general of India d) Governor of a state
14. Procedure to amend the constitution is contained in
 a) Article 268 b) Article 368
 c) Article 338 d) Article 238
15. Article 21(A) was a gift of
 a) 81st Amendment Act b) 82nd Amendment Act
 c) 86th Amendment Act d) 89th Amendment Act
16. The date of adaption and enactment of Indian constitution is
 a) 26 - 11 - 1949 b) 26 - 12 - 1949
 c) 26 - 1 - 1950 d) 26 - 1 - 1949
17. The source of authority of the Indian constitution is
 a) The government of India b) The people of India
 c) The president d) The parliament
18. The state whose executive head is elected representative is called
 a) The Dictatorship b) The Monarchy
 c) The Anarchy d) The Republic
19. Part - III of the constitution guarantees how many categories of fundamental rights
 a) Five b) Six c) Seven d) Eight

20. Right to property is a
a) Ordinary right
b) Fundamental right
c) Moral right
d) Birth right
21. The constitution guarantees fundamental rights to
a) Citizens
b) Non – citizens
c) Both citizens and Non – citizen
d) None of these
22. Ex – post-facto-law means
a) Law imposing penalties from previous date
b) Law imposing penalties from future date
c) Civil law
d) Criminal law
23. An arrested person has how many number of rights under Article – 22
a) Six
b) Seven
c) Four
d) Five
24. There can be prohibition of religious instructions in which category of educational institution
a) Unaided
b) State aided
c) Minority
d) Independent
25. Minorities under Article – 30 are based on
a) Religion only
b) Language only
c) None these
d) Religion or language
26. Is it possible to separate professional ethics from personal ethics?
a) No
b) Yes
c) Possible to some extent
d) None of these
27. The universal declaration of human rights was done in the year
a) 1993
b) 1947
c) 1948
d) 1950
28. In Good works views focus is given on
a) The concept of responsibility beyond the legal and moral duty
b) The concept of skillful work
c) The concept of legal work
d) The concept of logical work
29. Honesty is
a) Perfectness
b) Readiness
c) Truthfulness
d) Surrendering to God
30. Trade secrete does not include
a) Formulas
b) Colours
c) Patterns
d) Devices
31. Patent right is for
a) 10 years
b) 40 years
c) 50 years
d) 20 years

32. Risk in engineering means
a) The potential that something unwanted may occur
b) Taking risk to venture out something
c) Without taking risk nothing can be achieved
d) An inadvertent oversight
33. Liability means
a) Compensation is not obligatory
b) When a customer buys a service or product liability ceases
c) When an act harms others it must be compensated
d) None of these
34. It is not a kind of trade mark
a) Good will b) Symbols c) Sounds d) Designs
35. Formula of a soft drink is an example of
a) Patent b) Copy right c) Trade mark d) Trade secret
36. For an ethical engineer responsibility is
a) Moral responsibility
b) Both legal and moral responsibility
c) Legal responsibility
d) Social responsibility
37. One of the views on the responsibility of engineer is
a) They are strictly liable
b) They should do good works
c) They are absolutely reliable
d) They should take reasonable responsibility
38. This is not the impediment to responsibility
a) Self respect b) Ignorance
c) Self deception d) Fear
39. The recent fundamental duty added by 86th amendment in 2002 is,
a) Duty to safe guard public property
b) Duty of parent or guardian to provide education to his child
c) Duty to protect and improve the natural environment
d) Duty to abide by the constitution
40. How many parts does the parliament consists of? What are those?
a) Two – Lok Sabha and Rajya Sabha
b) Four – Lok Sabha, Rajya Sabha, speaker and President
c) Two – President and Vice – president
d) Three – Lok Sabha, Rajya Sabha and President

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CBCS Scheme

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15PCD13/23

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

Programming in C and Data Structures

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. What is a variable? Explain the rules for constructing variables in C language. Give examples for valid and invalid variables. (06 Marks)

b. Write C expressions corresponding to the following (Assume all quantities are of same type):

i) $A = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$

ii) $B = e^{x^2 - 20}$

iii) $C = \frac{x}{b+c} + \frac{y}{b-c}$

iv) $D = \sqrt{2\pi n}$

v) $E = \sin \theta$

vi) $F = \sin\left(\frac{b}{\sqrt{a^2 + b^2}}\right)$

(06 Marks)

c. Write a C program to find area of a circle. (04 Marks)

OR

2 a. List all the operators supported in C. Explain relational, logical and bitwise operators. (08 Marks)

b. Write a C program to find area of a triangle, when we know the lengths of all three of its sides. (08 Marks)

Module-2

3 a. List all the conditional control statements used in C. Explain if...else and nested if statements with example for each. (08 Marks)

b. Write a C program to simulate simple calculator that performs arithmetic operations using switch statement. Error message should be displayed, if any attempt is made to divide by zero. (08 Marks)

OR

4 a. Explain the different types of loops used in C with syntax and example for each. (08 Marks)

b. Write a C program to find the sum of series $1 + x + x^2 + x^3 + \dots + x^n$. (08 Marks)

Module-3

5 a. What is an array? Explain different methods of initialization of single dimensional array. (08 Marks)

b. Write a C program to sort the given array elements in ascending order by using bubble sort. (08 Marks)

OR

6 a. Write a C program to compute the factorial of a given number 'n' using recursion. (08 Marks)

b. Explain any four string manipulation library functions with example. (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

Module-4

- 7 a. Write a C program to input the following details of 'N' students using structure:
Roll_No: integer, Name : string, Marks : float, Grade : Char
Print the names of the students with marks ≥ 70.0 . (08 Marks)
- b. Explain the following file operations along with syntax:
i) fopen() ii) fclose() iii) fscanf() iv) fprintf() (08 Marks)

OR

- 8 a. Write a C program to maintain a record of 'n' employee detail using an array of structures with three fields (id, name, salary) and print the details of employees whose salary is above Rs.10,000. (08 Marks)
- b. Explain structure within a structure with an example. (08 Marks)

Module-5

- 9 a. Define a pointer. Explain with an example, the declaration and initialization of a pointer variable. (06 Marks)
- b. Develop a C program to read two numbers and function to swap these numbers using pointers. (06 Marks)
- c. Explain the following C functions along with syntax: i) malloc() ii) calloc() (04 Marks)

OR

- 10 a. Explain stack and queue data structures along with their applications. (08 Marks)
- b. Explain any four preprocessor directives in C language with example for each. (08 Marks)

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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15MAT21

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

Engineering Mathematics – II

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Solve $\frac{d^3y}{dx^3} - \frac{d^2y}{dx^2} + \frac{4dy}{dx} - 4y = \sinh(2x+3)$ by inverse differential operator method. (05 Marks)
- b. Solve $\frac{d^2y}{dx^2} - \frac{3dy}{dx} + 2y = xe^{3x} + \sin 2x$ by inverse differential operator method. (05 Marks)
- c. Solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$ by the method of variation of parameters. (06 Marks)

OR

- 2 a. Solve $y'' - 2y' + y = x \cos x$ by inverse differential operator method. (05 Marks)
- b. Solve $\frac{d^2y}{dx^2} + 4y = x^2 + 2^{-x} + \log 2$ by inverse differential operator method. (05 Marks)
- c. Solve $\frac{d^2y}{dx^2} + \frac{2dy}{dx} + 4y = 2x^2 + 3e^{-x}$ by the method of undetermined coefficients. (06 Marks)

Module-2

- 3 a. Solve $x^3 \frac{d^3y}{dx^3} + 3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x + \log x$. (05 Marks)
- b. Solve $y - 2px = \tan^{-1}(x p^2)$. (05 Marks)
- c. Solve $xy \left(\frac{dy}{dx} \right)^2 - (x^2 + y^2) \frac{dy}{dx} + xy = 0$. (06 Marks)

OR

- 4 a. Solve $(2x+5)^2 y'' - 6(2x+5)y' + 8y = 6x$. (05 Marks)
- b. Solve $y = 2px + y^2 p^3$. (05 Marks)
- c. Solve the equation: $(px-y)(py+x) = a^2 p$ by reducing into Clairaut's form, taking the substitution $X = x^2, Y = y^2$. (06 Marks)

Module-3

- 5 a. Obtain the partial differential equation by eliminating the arbitrary function given $z = yf(x) + x\phi(y)$. (05 Marks)
- b. Solve $\frac{\partial^2 z}{\partial x^2} = xy$ subject to the conditions $\frac{\partial z}{\partial x} = \log(1+y)$ when $x = 1$, and $z = 0$ when $x = 0$. (05 Marks)
- c. Derive one dimensional heat equation in the form $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$. (06 Marks)

OR

- 6 a. Obtain the partial differential equation given $f\left(\frac{xy}{z}, z\right) = 0$. (05 Marks)
- b. Solve $\frac{\partial^2 z}{\partial x^2} + 3\frac{\partial z}{\partial x} - 4z = 0$ subject to the conditions that $z = 1$ and $\frac{\partial z}{\partial x} = y$ when $x = 0$. (05 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. (06 Marks)

Module-4

- 7 a. Evaluate $I = \int_0^a \int_0^{\sqrt{a^2-x^2}} \int_0^{\sqrt{a^2-x^2-y^2}} xyz \, dz \, dy \, dx$. (05 Marks)
- b. Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ by double integration. (05 Marks)
- c. Derive the relation between beta and gamma function as $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$. (06 Marks)

OR

- 8 a. Evaluate $\int_0^a \int_0^a \frac{x \, dx \, dy}{x^2 + y^2}$ by changing the order of integration. (05 Marks)
- b. Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} y\sqrt{x^2+y^2} \, dx \, dy$ by changing into polar co-ordinates. (05 Marks)
- c. Evaluate $\int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin \theta}} \times \int_0^{\pi/2} \sqrt{\sin \theta} \, d\theta$ by using Beta-Gamma functions. (06 Marks)

Module-5

- 9 a. Find the Laplace transform of $te^{2t} + \frac{\cos 2t - \cos 3t}{t} + t \sin t$. (05 Marks)
- b. Express the function $f(t) = \begin{cases} \pi - t, & 0 < t \leq \pi \\ \sin t, & t > \pi \end{cases}$ in terms of unit step function and hence find its Laplace transform. (05 Marks)
- c. Solve $y'' + 6y' + 9y = 12t^2e^{-3t}$ subject to the conditions, $y(0) = 0 = y'(0)$ by using Laplace transform. (06 Marks)

OR

- 10 a. Find the inverse Laplace form of $\frac{7s+4}{4s^2+4s+9}$. (05 Marks)
- b. Find the Laplace transform of the full wave rectifier $f(t) = E \sin \omega t$, $0 < t < \pi/\omega$ having period π/ω . (05 Marks)
- c. Obtain the inverse Laplace transform of the function $\frac{1}{(s-1)(s^2+1)}$ by using convolution theorem. (06 Marks)

CBCS Scheme

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15ELE15/25

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

Basic Electrical Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. State and explain Kirchhoff's law. (05 Marks)
 b. Refer Fig Q1(b). Find I_1 , I_2 and I_3 . (07 Marks)

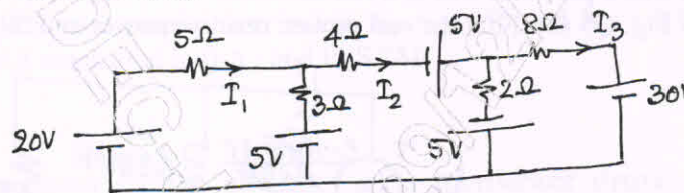


Fig. Q1(b)

- c. Coil A of 230 turns and coil B of 240 turns share a magnetic circuit of mean length 0.8m and uniform cross section area 115cm^2 . Relative permeability of the core material is 1350. Find the self inductances of the coils. Find the average emf induced in coil A when, in coil B, the current changes from 2A to 6.5A in 0.03s. Assume $k = 1.0$ between the coils. (04 Marks)

OR

- 2 a. Define 'Self Inductance' of a coil. Derive an expression for the self inductance of a coil in terms of its geometry and material properties. (05 Marks)
 b. Refer Fig Q2(b) find I_1 , I_2 and the power in the 6Ω resistor. (07 Marks)

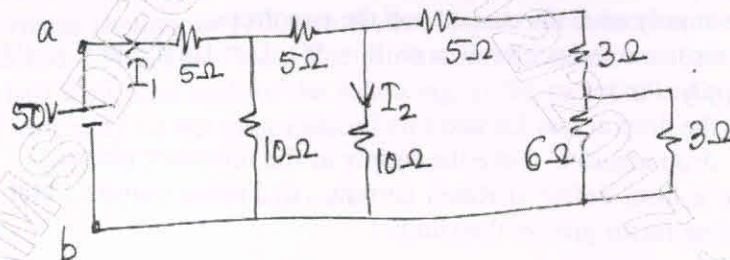


Fig. Q2(b)

- c. Coil A of 600 turns and coil B of 500 turns have $k = 0.2$. A current of 8A in coil A produces 40mWb flux in it. Find : i) Inductance of coil A with coil B open circuited ; ii) the flux linking coil B ; iii) the emf induced in coil B if the flux linking it falls to zero from its full value in 2ms ; and iv) mutual inductance between the coils. (04 Marks)

Module-2

- 3 a. Deduce an expression for the armature torque, T_a , developed in a dc motor and hence show that $T_a \propto \phi I_a$. (02 Marks)
 b. A 100V short shunt dc generator supplies 200 lamps of 55W at 110V rating. $R_a = 0.06\Omega$; $R_{sc} = 0.04\Omega$; and $R_{sh} = 25\Omega$. Sketch the circuit diagram and find the emf generated. (07 Marks)
 c. With a neat sketch, explain the working of a 1ϕ energy meter. (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

- 4 a. "A dc series motor should never be run on light or no load". Justify. (03 Marks)
 b. A shunt dc generator delivers 65kW at 250V and 500rpm. $R_a = 0.015\Omega$ and $R_{sh} = 85\Omega$. Find its speed when running as a motor taking 40kW from 240V supply. BCD = 1V/Brush. Sketch relevant circuit diagrams. (07 Marks)
 c. With a neat schematic, describe the construction and working of a dynamometer type wattmeter. (06 Marks)

Module-3

- 5 a. Show that a pure inductor is lossless. (03 Marks)
 b. Refer Fig. Q5 (b). Find the real power, reactive power and the apparent power supplied.

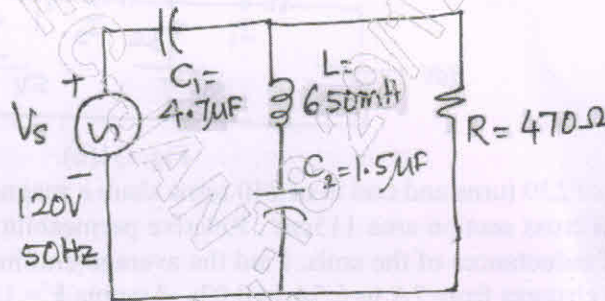


Fig. Q5(b)

(06 Marks)

- c. With a neat circuit diagram and truth table, explain the working of a 3-way control of a device. (07 Marks)

OR

- 6 a. Show that an R-C series circuit takes a leading current. Sketch a phasor diagram indicating the supply emf, the current and the two drops. (07 Marks)
 b. A resonant series circuit with $R = 5\Omega$, $L = 1\text{mH}$ and $C = 0.001\mu\text{F}$ is connected to a 100V supply. Find :
 i) the drop across L ; and
 ii) drop across C. Take the supply as the reference phasor. (05 Marks)
 c. For a fuse, define i) Rated current, ii) Fusing current ; and iii) Fusing factor. Why is the fusing factor greater than unity? (04 Marks)

Module-4

- 7 a. Sketch a 4-wire STAR supply and identify the phase and line voltages. With balanced supply taking $E_R = E_P \angle 0^\circ$, obtain the relationship between the phase and line voltages. Hence, sketch a phasor diagram indicating all phase and line voltages. (08 Marks)
 b. 2 wattmeters connected to measures 3ϕ power of a balanced Δ load read 2.5 kW and 0.5kW. Find the load pf if i) both readings are positive; and ii) the latter reading is obtained after reversing the connections of the potential coil. (04 Marks)
 c. In a 3ϕ alternator, why is it advantageous to have the armature on the stator and the excitation on the rotor? (04 Marks)

OR

- 8 a. With a neat circuit diagram, show how 3 ϕ power can be measured using two Wattmeters. State the NECESSARY CONDITION clearly. (07 Marks)
- b. A balanced Δ load of $(8+j6) \Omega$ /phase is connected to a 400V supply. Find i) the phase current ii) the line current. If the same impedances are connected in STAR, what is the reactive power consumed and at what pf? (04 Marks)
- c. A 4-pole, 3 ϕ alternator driven at 1800rpm has 42 slots with 4 conductors/slot. Average flux/pole is 0.36 Wb, sinusoidally distributed. $K_p = 0.956$ and $K_d = 0.952$. Find the line voltage on no-load if connected in i) Δ ; and ii) STAR. (05 Marks)

Module-5

- 9 a. Starting from expression for the efficiency of a transformer derive the condition for maximum efficiency and the expression for maximum efficiency. (05 Marks)
- b. A 135 kVA, 1 ϕ transformer has primary of 2kV, 50Hz. Primary and secondary number of turns are 162 and 48 respectively. Neglecting losses, find i) no-load secondary emf ; ii) full load primary and secondary currents; and iii) maximum core flux. (04 Marks)
- c. With a neat sketch, explain the working of a STAR - Δ starter, for a 3 ϕ induction motor. Show that the starting inrush current is reduced by 66.7%. (07 Marks)

OR

- 10 a. "A 3 ϕ induction motor can never run at N_s ". Justify. (04 Marks)
- b. A single phase transformer has a maximum efficiency of 98% at 75% load, upf. The copper loss at maximum efficiency is 314W. Find its efficiency at 50% load, 0.9 pf. (04 Marks)
- c. A 6-pole, 3 ϕ alternator running at 1200rpm feeds a 4-pole, 3 ϕ induction motor having slips of 3% at full load and 2.5% at half load. The rotor induced emf/phase at stand still is 160V. At full load and half load, find each of the following: i) the motor speed ; ii) frequency of the rotor induced emf and (iii) the rotor induced emf/phase. (08 Marks)

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CBCS Scheme

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

Constitution of India, Professional Ethics & Human Rights

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the forty 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. The Governor of the state is
a) Directly elected by the people
b) Elected by the state legislature
c) Appointed by the president
d) Nominated by the parliament
 2. The ordinances issued by the state governor are subject to approval by
a) The president of India
b) Chief minister of the state
c) Union parliament
d) State legislature concerned
 3. High court judges retire at the age of
a) 65 years
b) 63 years
c) 60 years
d) 62 years
 4. The executive of the state government comprises of
a) President, governor and chief minister
b) Governor and chief minister
c) Governor and council of ministers
d) Chief minister and council of ministers
 5. When a state assembly is dissolved, the law making power for the state concerned rests with the
a) State governor
b) Union parliament
c) President of India
d) Chief justice of India
 6. The total members in the legislature council should not be less than,
a) 250
b) 80
c) 20
d) 40

7. The number of council of ministers including the chief minister shall not exceed the total number of MLAs
 a) 25% b) 30% c) 15% d) 20%
8. To become a judge of the high court one must be a practicing advocate of high court for at least
 a) 10 years b) 20 years c) 15 years d) 5 years
9. Judicial activism is
 a) For curtailment of the power of the government
 b) For the protection of the rights of the citizens
 c) For the curtailment of the active organization
 d) For the follow up of the court directions
10. Practices derogatory to the status of women is renounced under
 a) Article 51(A)(e) b) Article 32(c)
 c) Article 51 d) None of these
11. Proclamation of national emergency must be approved within
 a) 2 months b) 1 month c) 6 months d) 1 year
12. State emergency is also called as
 a) President's rule b) Prime minister's rule
 c) Governor's rule d) Chief justice's rule
13. The removal of chief election, commissioner may be on the grounds similar to that of
 a) Judge of a high court b) Judge of a supreme court
 c) Attorney general of India d) Governor of a state
14. Procedure to amend the constitution is contained in
 a) Article 268 b) Article 368
 c) Article 338 d) Article 238
15. Article 21(A) was a gift of
 a) 81st Amendment Act b) 82nd Amendment Act
 c) 86th Amendment Act d) 89th Amendment Act
16. The date of adaption and enactment of Indian constitution is
 a) 26 – 11 – 1949 b) 26 – 12 – 1949
 c) 26 – 1 – 1950 d) 26 – 1 – 1949
17. The source of authority of the Indian constitution is
 a) The government of India b) The people of India
 c) The president d) The parliament
18. The state whose executive head is elected representative is called
 a) The Dictatorship b) The Monarchy
 c) The Anarchy d) The Republic
19. Part – III of the constitution guarantees how many categories of fundamental rights
 a) Five b) Six c) Seven d) Eight

20. Right to property is a
 a) Ordinary right
 b) Fundamental right
 c) Moral right
 d) Birth right
21. The constitution guarantees fundamental rights to
 a) Citizens
 b) Non – citizens
 c) Both citizens and Non – citizen
 d) None of these
22. Ex – post-facto-law means
 a) Law imposing penalties from previous date
 b) Law imposing penalties from future date
 c) Civil law
 d) Criminal law
23. An arrested person has how many number of rights under Article – 22
 a) Six
 b) Seven
 c) Four
 d) Five
24. There can be prohibition of religious instructions in which category of educational institution
 a) Unaided
 b) State aided
 c) Minority
 d) Independent
25. Minorities under Article – 30 are based on
 a) Religion only
 b) Language only
 c) None these
 d) Religion or language
26. Is it possible to separate professional ethics from personal ethics?
 a) No
 b) Yes
 c) Possible to some extent
 d) None of these
27. The universal declaration of human rights was done in the year
 a) 1993
 b) 1947
 c) 1948
 d) 1950
28. In Good works views focus is given on
 a) The concept of responsibility beyond the legal and moral duty
 b) The concept of skillful work
 c) The concept of legal work
 d) The concept of logical work
29. Honesty is
 a) Perfectness
 b) Readiness
 c) Truthfulness
 d) Surrendering to God
30. Trade secrete does not include
 a) Formulas
 b) Colours
 c) Patterns
 d) Devices
31. Patent right is for
 a) 10 years
 b) 40 years
 c) 50 years
 d) 20 years

32. Risk in engineering means
a) The potential that something unwanted may occur
b) Taking risk to venture out something
c) Without taking risk nothing can be achieved
d) An inadvertent oversight
33. Liability means
a) Compensation is not obligatory
b) When a customer buys a service or product liability ceases
c) When an act harms others it must be compensated
d) None of these
34. It is not a kind of trade mark
a) Good will b) Symbols c) Sounds d) Designs
35. Formula of a soft drink is an example of
a) Patent b) Copy right c) Trade mark d) Trade secret
36. For an ethical engineer responsibility is
a) Moral responsibility
b) Both legal and moral responsibility
c) Legal responsibility
d) Social responsibility
37. One of the views on the responsibility of engineer is
a) They are strictly liable
b) They should do good works
c) They are absolutely reliable
d) They should take reasonable responsibility
38. This is not the impediment to responsibility
a) Self respect b) Ignorance
c) Self deception d) Fear
39. The recent fundamental duty added by 86th amendment in 2002 is,
a) Duty to safe guard public property
b) Duty of parent or guardian to provide education to his child
c) Duty to protect and improve the natural environment
d) Duty to abide by the constitution
40. How many parts does the parliament consists of? What are those?
a) Two – Lok Sabha and Rajya Sabha
b) Four – Lok Sabha, Rajya Sabha, speaker and President
c) Two – President and Vice – president
d) Three – Lok Sabha, Rajya Sabha and President

CBCS Scheme

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15CHE12/22

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

Engineering Chemistry

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is an ion selective electrode? Explain the method of determining the pH of a solution using glass electrode. (06 Marks)
- b. Discuss the construction and working of Zinc – air battery. (05 Marks)
- c. What are fuel cells? How it is different from a galvanic cell? Mention any two advantages of fuel cells. (05 Marks)

OR

- 2 a. Describe the construction and working principle of glass electrode. (06 Marks)
- b. Explain the construction and working of Ni – metal hydride batteries. (06 Marks)
- c. What are concentration cells? The emf of the cell $\text{Cu} | \text{CuSO}_4 (0.01\text{M}) || \text{CuSO}_4 (\text{XM}) | \text{Cu}$ is 0.0295V at 25°C. Find the value of X. (04 Marks)

Module-2

- 3 a. Define corrosion. Explain electrochemical theory of corrosion. (06 Marks)
- b. What is Anodization? Explain anodization of aluminium. (06 Marks)
- c. Mention the difference between electroplating and electroless plating. (04 Marks)

OR

- 4 a. Write a note on polarization and over potential. (06 Marks)
- b. What is galvanization? Describe the galvanization process for iron. (05 Marks)
- c. Explain the process of electroplating of hard chromium. (05 Marks)

Module-3

- 5 a. Define calorific value. Explain how calorific value of solid fuel is determined by bomb calorimeter. (07 Marks)
- b. Explain the synthesis of petrol by Fischer – Tropsch process. (05 Marks)
- c. Write the advantages and disadvantages of PV cells. (04 Marks)

OR

- 6 a. What is knocking in IC engines? Explain its mechanism with chemical reactions. (06 Marks)
- b. Explain the modules, panels and arrays of PV cells. (06 Marks)
- c. What is reforming of petroleum? Give any three reactions involved in reformation. (04 Marks)

Module-4

- 7 a. What are conducting polymers? Discuss the conduction mechanism in polyaniline and mention any two applications. (07 Marks)
- b. What is glass transition temperature? Explain any 3 factors influencing Tg values. (05 Marks)
- c. Explain the synthesis and applications of silicon rubber. (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

- 8 a. A polymer has the following composition 100 molecules of molecular mass 1000g/mol, 200 molecules of molecular mass 2000g/mol and 500 molecules of molecular mass 5000g/mol. Calculate the number and weight average molecular weight. (06 Marks)
- b. Explain the synthesis and applications of : i) PMMA and ii) Epoxy resin. (06 Marks)
- c. Distinguish between addition and condensation polymerization with example. (04 Marks)

Module-5

- 9 a. Define COD. Discuss the experimental determination of COD of waste water. (06 Marks)
- b. Define desalination. Explain desalination of sea water by electro dialysis process. (06 Marks)
- c. Write a note on carbon nano tubes. Mention its applications. (04 Marks)

OR

- 10 a. Discuss the boiler corrosion due to O_2 , CO_2 and $MgCl_2$ and its control. (07 Marks)
- b. Explain the synthesis of nano materials by sol-gel process. (05 Marks)
- c. Write a note on priming and foaming. (04 Marks)

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OR

Module 3

CBCS Scheme

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15CIV13/23

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

Time: 3 hrs.

Max. Marks:80

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

Module-1

- 1 a. Name different fields of civil engineering and explain any two of them. (06 Marks)
b. With neat sketch, explain any two types of dams. (06 Marks)
c. Find the moment of 500N force about points A, B, C and D as shown in Fig.Q1(C). (04 Marks)

OR

- 2 a. Explain the role of civil engineer in infrastructural development of the country. (06 Marks)
b. Explain the Nagpur road plan classification. (06 Marks)
c. A square ABCD has forces acting along its sides as shown in Fig.Q2(c). Find the value of P and Q, if the system reduces to a couple. Also find magnitude of the couple if the side of the square is 2m. (04 Marks)

Module-2

- 3 a. State and prove parallelogram law of forces. (06 Marks)
b. The forces acting on the system are shown in Fig.Q2(b). Determine the magnitude and direction of the resultants. (06 Marks)
c. With neat sketches explain angle of friction, angle of repose and cone of friction. (04 Marks)

OR

- 4 a. State laws of dry friction. (04 Marks)
b. A chord supported at A and B carries a load of 100kN at D and a load of W at C as shown in Fig.Q4(b). Find the values of W so that CD remains horizontal. Also determine tension in each chord. (06 Marks)
c. A block weighing 4000N is resting on horizontal surface supports another block of 2000N as shown in Fig.Q4(c). Find the horizontal force F just to move the block to the left. Take coefficient of friction for all surfaces of contact to be 0.2. (06 Marks)

Module-3

- 5 a. State and prove Varignon's principle of moments. (06 Marks)
b. A rigid plate is subjected to the forces as shown in Fig.Q5(b). Compute magnitude direction and position of resultant force with respect to centroid point O of the plate. (06 Marks)
c. Determine the support reactions for the beam shown in Fig.Q5(c). (04 Marks)

OR

- 6 a. With neat sketches indicating the reactions explain types of supports. (04 Marks)
 b. The forces acting on 1m length of a dam are as shown in Fig.Q6(b). Determine the magnitude, direction and position of resultant from O. (06 Marks)
 c. A uniform beam AB hinged at A, is kept horizontal by supporting and settling a 400kN with the help of a rope tied at B and passing over smooth pulley at C. The bar weights 200kN. Determine the reactions at the supports A and C as well as the tension in the string. Refer Fig.Q6(c). (06 Marks)

Module-4

- 7 a. State and prove parallel axis theorem. (05 Marks)
 b. From first principles determine the centroid of a rectangle. (05 Marks)
 c. Determine the centroid of the area shown in Fig.A7(c) with respect to the axis shown. (06 Marks)

OR

- 8 a. From first principles determine the centroid of quarter circle. (06 Marks)
 b. Determine the moment of inertia of the symmetric I section shown in Fig.Q8(b) about its centroidal x – x axis and y – y axis. Also determine polar moment of inertia. (10 Marks)

Module-5

- 9 a. Derive the expression for maximum height attained by the projectile. (05 Marks)
 b. A car starts from rest and accelerates uniformly to a speed of 75 kmph over a distance of 1000M. Find acceleration of the car and time taken to attain this speed. If a further acceleration rises the speed to 100kmph in 10sec, find the new acceleration and the further distance moved. (05 Marks)
 c. The equation of motion of particle is given by $a = 4t^3 - 3t^2 + 6$ where a : acceleration in m/sec^2 and t : time in seconds. The velocity of the particle at $t = 1$ second is 5.0 m/sec and displacement is 10m. Determine the displacement and velocity at $t = 5$ seconds. (06 Marks)

OR

- 10 a. What is super elevation? Explain the objects of providing super elevation. (04 Marks)
 b. A ball was thrown vertically upwards from the ground with the velocity of 60m/sec. After 3 seconds another ball was thrown vertically upwards from the ground. If both the balls strike the ground at the same time, determine the velocity with which the second ball was thrown. (06 Marks)
 c. A particle is projected in air with a velocity of 120m/sec at an angle of 30° with the horizontal. Determine :
 i) The horizontal range
 ii) Maximum height attained by the particle
 iii) The time of flight. (06 Marks)

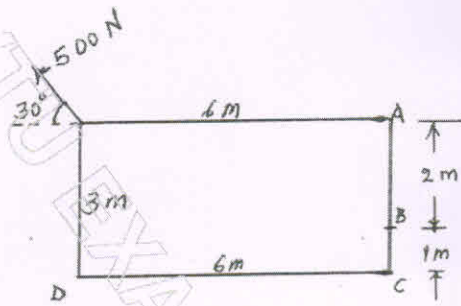


Fig.Q1(c)

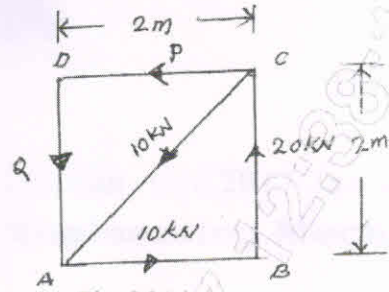


Fig.Q2(c)

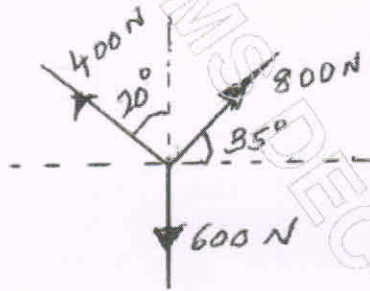


Fig.Q3(b)

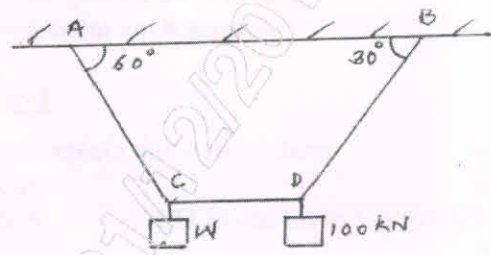


Fig.Q4(b)

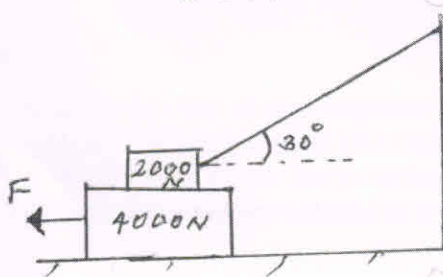


Fig.Q4(c)

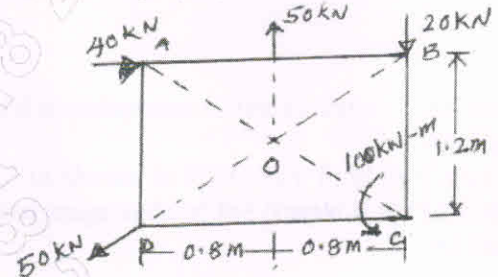


Fig.Q5(b)

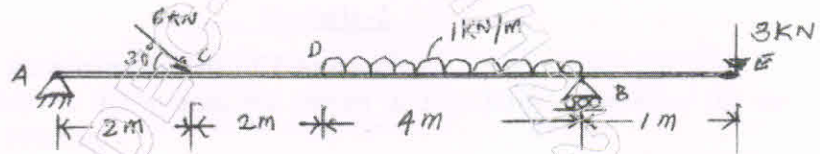


Fig.Q5(C)

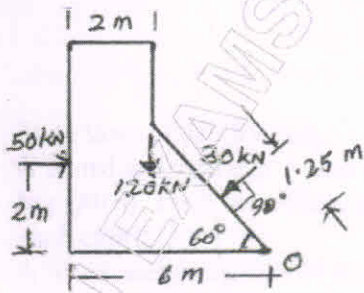


Fig.Q6(b)

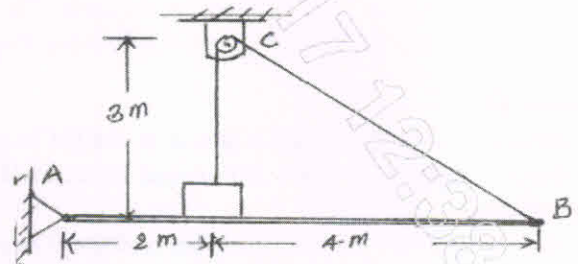


Fig.Q6(c)

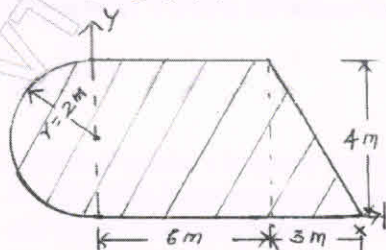


Fig.Q7(c)

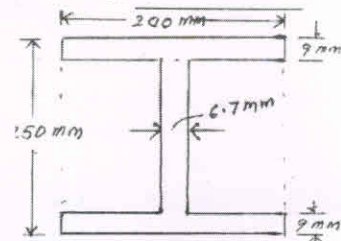


Fig.Q8(b)

CBCS Scheme

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

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the forty 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 whiteeners** on the **OMR** sheets are strictly prohibited.

1. The objective of environmental education is
 - a) Raise consciousness about environmental conditions
 - b) To teach environmentally appropriate behaviour
 - c) Create an environmental ethic
 - d) All of the above.
2. Which of the following is a biotic component of an ecosystem?
 - a) Fungi
 - b) Solar light
 - c) Temperature
 - d) humidity.
3. In complex ecosystems the degree of species diversity is
 - a) Poor
 - b) High
 - c) Medium
 - d) None.
4. Which of the following statement is false
 - a) Inorganic nutrients are recycled in an ecosystem
 - b) Energy "flows" through the ecosystem in the form of carbon-carbon bonds
 - c) Energy is recycled in an ecosystem
 - d) Respiration process releases energy.
5. In an ecosystem biological cycling of materials is maintained by
 - a) Procedure
 - b) Consumer
 - c) Decomposer
 - d) All of the above.

6. A predator is
 a) An animal that is fed upon
 b) An animal that feeds upon another animal
 c) Animal that feeds upon both plants and animals
 d) A primary consumer.
7. Ozone concentration is relatively more in
 a) Mesosphere b) Stratosphere c) Staticsphere d) Atmosphere.
8. World environmental day is on
 a) 5th May b) 5th June c) 15th June d) 15th May.
9. EIA can be expanded as
 a) Environment of Industrial Act b) Environment Important Act
 c) Environment Impact Assessment d) Economic Industrial Act.
10. Major purpose of most of the dams are
 a) Power generation b) Drinking c) Flood control d) Irrigation.
11. Eutrophication is related to
 a) Water b) Soil c) Air d) Land.
12. Water logging is effect of modern
 a) Industries b) Agriculture c) Population d) Education.
13. Bioremediation means removal of contaminates by
 a) Mining b) Super bugs c) Air d) Water.
14. Nitrate contamination causes
 a) White baby syndrom b) Blue baby syndrom
 c) Green baby syndrom d) Black baby syndrom.
15. Out of the following nutrients in fertilizers which one causes minimum water pollution
 a) Nitrogen b) Phosphorous c) Potassium d) Organic matter.
16. Fluorosis is caused due to
 a) Chlorine b) Fluoride c) Feldspar d) Farming.
17. Hepatitis is caused by
 a) Hepata worm b) Virus c) Amoeba d) Fungus.
18. Chernobyl disaster occurred in the year
 a) 1986 b) 2006 c) 2011 d) 1947.

19. Fukushima disaster is a
a) Heavymetal disaster
b) Nuclear disaster
c) Atom bomb disaster
d) Pesticide disaster.
20. A country without a single nuclear power plant is
a) China
b) USA
c) Australia
d) France.
21. Which of the following is more ecofriendly source of producing energy
a) Biogas
b) Coal
c) Fuel cells
d) Hydel
22. Electromagnetic radiation can cause
a) Plague
b) Dengue
c) Cancer
d) Malaria.
23. Wind farms are located in
a) River basin
b) Plain areas
c) Hilly areas
d) Forest areas.
24. Natural gas contains
a) Methane
b) Oxygen
c) Nitrogen
d) Sulphur.
25. The source of electromagnetic radiation is
a) Magnetics
b) Electrons
c) Sun
d) Earth.
26. Which of the following sources is surface water
a) Springs
b) Streams
c) Wells
d) all.
27. Which of the following is an air pollutant
a) CO
b) O₂
c) N₂
d) all.
28. Smog in London was due to
a) SO₂ and NO₂
b) CO₂ and CO
c) Methane and ethane
d) Water and air.
29. Which of the following are Non-biodegradable
a) Plastics
b) Domestic sewage
c) Detergent
d) a and c
30. Endosulfan is a
a) Organization
b) Institution
c) Pesticide
d) River
31. Minameta disease is caused due to
a) Lead
b) Copper
c) Mercury
d) Arsenic.
32. World's single largest class of refugees is due to
a) War
b) Earthquake
c) Tsunami
d) Environmental degradation.

33. Noise pollution limits at airport area
a) 65dB b) 120dB c) 240dB d) 600dB.
34. Blaring sounds are known to cause
a) Metal distress b) Deafness
c) Neurological problems d) All the above.
35. Increase in asthma attacks has been linked to high levels of
a) Soil borne pesticides b) Air borne dust portsides
c) CO₂ d) Green house gases.
36. Population explosion will cause
a) Biodiversity b) Stress on the ecosystem
c) Better communication d) Energy storage.
37. The Protocol that reduces green house gas emissions are
a) Kyoto protocol b) Cartagena protocol
c) Montreal Protocol d) Delhi protocol.
38. Global warming could affect
a) Climate b) Increase in sea level c) Melting of glaciers d) All of the above.
39. Primary cause of acid rain around the world is due to
a) CO₂ b) CO c) SO₂ d) O₃.
40. Reduction in brightness and the famous Taj Mahal is due to
a) Global warming b) Green house gases
c) Ozone deflection d) Air pollution.

CBCS Scheme

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15ELE15/25

First/Second Semester B.E. Degree Examination, Dec.2017/Jan.2018 Basic Electrical Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. State and explain Kirchhoff's law. (05 Marks)
 b. Refer Fig Q1(b). Find I_1 , I_2 and I_3 . (07 Marks)

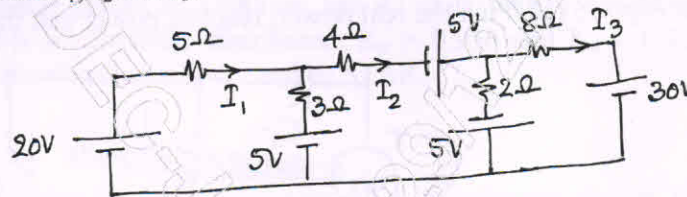


Fig. Q1(b)

- c. Coil A of 230 turns and coil B of 240 turns share a magnetic circuit of mean length 0.8m and uniform cross section area 115cm^2 . Relative permeability of the core material is 1350. Find the self inductances of the coils. Find the average emf induced in coil A when, in coil B, the current changes from 2A to 6.5A in 0.03s. Assume $k = 1.0$ between the coils. (04 Marks)

OR

- 2 a. Define 'Self Inductance' of a coil. Derive an expression for the self inductance of a coil in terms of its geometry and material properties. (05 Marks)
 b. Refer Fig Q2(b) find I_1 , I_2 and the power in the 6Ω resistor. (07 Marks)

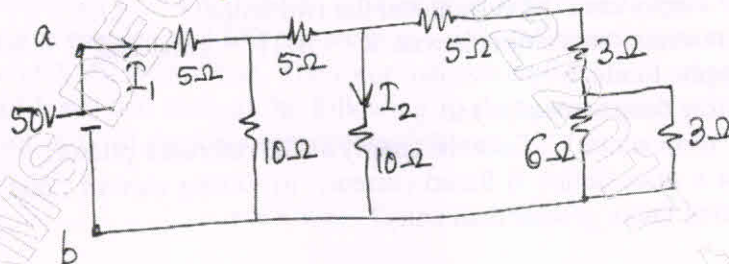


Fig. Q2(b)

- c. Coil A of 600 turns and coil B of 500 turns have $k = 0.2$. A current of 8A in coil A produces 40mWb flux in it. Find : i) Inductance of coil A with coil B open circuited ; ii) the flux linking coil B ; iii) the emf induced in coil B if the flux linking it falls to zero from its full value in 2ms ; and iv) mutual inductance between the coils. (04 Marks)

Module-2

- 3 a. Deduce an expression for the armature torque, T_a , developed in a dc motor and hence show that $T_a \propto \phi I_a$. (02 Marks)
 b. A 100V short shunt dc generator supplies 200 lamps of 55W at 110V rating. $R_a = 0.06\Omega$; $R_{se} = 0.04\Omega$; and $R_{sh} = 25\Omega$. Sketch the circuit diagram and find the emf generated. (07 Marks)
 c. With a neat sketch, explain the working of a 1ϕ energy meter. (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

- 4 a. "A dc series motor should never be run on light or no load". Justify. (03 Marks)
 b. A shunt dc generator delivers 65kW at 250V and 500rpm. $R_a = 0.015\Omega$ and $R_{sh} = 85\Omega$. Find its speed when running as a motor taking 40kW from 240V supply. BCD = 1V/Brush. Sketch relevant circuit diagrams. (07 Marks)
 c. With a neat schematic, describe the construction and working of a dynamometer type wattmeter. (06 Marks)

Module-3

- 5 a. Show that a pure inductor is lossless. (03 Marks)
 b. Refer Fig. Q5 (b). Find the real power, reactive power and the apparent power supplied.

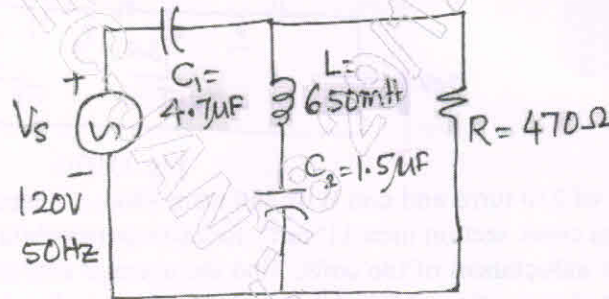


Fig. Q5(b)

(06 Marks)

- c. With a neat circuit diagram and truth table, explain the working of a 3-way control of a device. (07 Marks)

OR

- 6 a. Show that an R-C series circuit takes a leading current. Sketch a phasor diagram indicating the supply emf, the current and the two drops. (07 Marks)
 b. A resonant series circuit with $R = 5\Omega$, $L = 1\text{mH}$ and $C = 0.001\mu\text{F}$ is connected to a 100V supply. Find :
 i) the drop across L ; and
 ii) drop across C. Take the supply as the reference phasor. (05 Marks)
 c. For a fuse, define i) Rated current, ii) Fusing current ; and iii) Fusing factor. Why is the fusing factor greater than unity? (04 Marks)

Module-4

- 7 a. Sketch a 4-wire STAR supply and identify the phase and line voltages. With balanced supply taking $E_R = E_P \angle 0^\circ$, obtain the relationship between the phase and line voltages. Hence, sketch a phasor diagram indicating all phase and line voltages. (08 Marks)
 b. 2 wattmeters connected to measures 3 ϕ power of a balanced Δ load read 2.5 kW and 0.5kW. Find the load pf if i) both readings are positive; and ii) the latter reading is obtained after reversing the connections of the potential coil. (04 Marks)
 c. In a 3 ϕ alternator, why is it advantageous to have the armature on the stator and the excitation on the rotor? (04 Marks)

OR

- 8 a. With a neat circuit diagram, show how 3 ϕ power can be measured using two Wattmeters. State the NECESSARY CONDITION clearly. (07 Marks)
- b. A balanced Δ load of $(8+j6) \Omega$ /phase is connected to a 400V supply. Find i) the phase current ii) the line current. If the same impedances are connected in STAR, what is the reactive power consumed and at what pf? (04 Marks)
- c. A 4-pole, 3 ϕ alternator driven at 1800rpm has 42 slots with 4 conductors/slot. Average flux/pole is 0.36 Wb, sinusoidally distributed. $K_p = 0.956$ and $K_d = 0.952$. Find the line voltage on no-load if connected in i) Δ ; and ii) STAR. (05 Marks)

Module-5

- 9 a. Starting from expression for the efficiency of a transformer derive the condition for maximum efficiency and the expression for maximum efficiency. (05 Marks)
- b. A 135 kVA, 1 ϕ transformer has primary of 2kV, 50Hz. Primary and secondary number of turns are 162 and 48 respectively. Neglecting losses, find i) no-load secondary emf ; ii) full load primary and secondary currents; and iii) maximum core flux. (04 Marks)
- c. With a neat sketch, explain the working of a STAR - Δ starter, for a 3 ϕ induction motor. Show that the starting inrush current is reduced by 66.7%. (07 Marks)

OR

- 10 a. "A 3 ϕ induction motor can never run at N_s ". Justify. (04 Marks)
- b. A single phase transformer has a maximum efficiency of 98% at 75% load, upf. The copper loss at maximum efficiency is 314W. Find its efficiency at 50% load, 0.9 pf. (04 Marks)
- c. A 6-pole, 3 ϕ alternator running at 1200rpm feeds a 4-pole, 3 ϕ induction motor having slips of 3% at full load and 2.5% at half load. The rotor induced emf/phase at stand still is 160V. At full load and half load, find each of the following: i) the motor speed ; ii) frequency of the rotor induced emf and (iii) the rotor induced emf/phase. (08 Marks)

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15PCD13/23

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

Programming in C and Data Structures

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is a variable? Explain the rules for constructing variables in C language. Give examples for valid and invalid variables. (06 Marks)
- b. Write C expressions corresponding to the following (Assume all quantities are of same type):
- i) $A = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$ ii) $B = e^{x+y-20}$ iii) $C = \frac{x}{b+c} + \frac{y}{b-c}$
- iv) $D = \sqrt{2\pi n}$ v) $E = \sin \theta$ vi) $F = \sin\left(\frac{b}{\sqrt{a^2 + b^2}}\right)$ (06 Marks)
- c. Write a C program to find area of a circle. (04 Marks)

OR

- 2 a. List all the operators supported in C. Explain relational, logical and bitwise operators. (08 Marks)
- b. Write a C program to find area of a triangle, when we know the lengths of all three of its sides. (08 Marks)

Module-2

- 3 a. List all the conditional control statements used in C. Explain if...else and nested if statements with example for each. (08 Marks)
- b. Write a C program to simulate simple calculator that performs arithmetic operations using switch statement. Error message should be displayed, if any attempt is made to divide by zero. (08 Marks)

OR

- 4 a. Explain the different types of loops used in C with syntax and example for each. (08 Marks)
- b. Write a C program to find the sum of series $1 + x + x^2 + x^3 + \dots + x^n$. (08 Marks)

Module-3

- 5 a. What is an array? Explain different methods of initialization of single dimensional array. (08 Marks)
- b. Write a C program to sort the given array elements in ascending order by using bubble sort. (08 Marks)

OR

- 6 a. Write a C program to compute the factorial of a given number 'n' using recursion. (08 Marks)
- b. Explain any four string manipulation library functions with example. (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.

Module-4

- 7 a. Write a C program to input the following details of 'N' students using structure:
Roll_No: integer, Name : string, Marks : float, Grade : Char
Print the names of the students with marks ≥ 70.0 . (08 Marks)
- b. Explain the following file operations along with syntax:
i) fopen() ii) fclose() iii) fscanf() iv) fprintf() (08 Marks)

OR

- 8 a. Write a C program to maintain a record of 'n' employee detail using an array of structures with three fields (id, name, salary) and print the details of employees whose salary is above Rs.10,000. (08 Marks)
- b. Explain structure within a structure with an example. (08 Marks)

Module-5

- 9 a. Define a pointer. Explain with an example, the declaration and initialization of a pointer variable. (06 Marks)
- b. Develop a C program to read two numbers and function to swap these numbers using pointers. (06 Marks)
- c. Explain the following C functions along with syntax: i) malloc() ii) calloc() (04 Marks)

OR

- 10 a. Explain stack and queue data structures along with their applications. (08 Marks)
- b. Explain any four preprocessor directives in C language with example for each. (08 Marks)

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15PHY12/22

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

Engineering Physics

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.

2. Physical constants: $h = 6.625 \times 10^{-34}$ JS, $M_e = 9.1 \times 10^{-31}$ kg, $K = 1.38 \times 10^{-23}$ J/K,
 $C = 3 \times 10^8$ m/s, $e = 1.602 \times 10^{-19}$ C, $N_A = 6.025 \times 10^{+26}$ /k mol.

Module-1

- 1 a. Explain the energy distribution in the spectrum of a blackbody. (05 Marks)
b. Set up time independent Schrödinger wave equation in one dimension. (07 Marks)
c. A particle of mass $0.5 \text{ Me } \sqrt{c^2}$ has kinetic energy 100eV . Find its de-Broglie wavelength. (04 Marks)

OR

- 2 a. Define phase velocity and Group velocity. Show that group velocity is equal to particle velocity. (06 Marks)
b. State and explain Heisenberg's uncertainty principle. (06 Marks)
c. An electron is bound in one dimensional potential well of width 0.18nm . Find the energy value in eV of the second excited state. (04 Marks)

Module-2

- 3 a. What is superconductivity? Explain superconductivity on the basis of BCS theory. (06 Marks)
b. Explain the failures of classical free electron theory. (06 Marks)
c. Calculate the probability of an electron occupying an energy level 0.02 eV above the Fermi level at 400K in a material. (04 Marks)

OR

- 4 a. What is Fermi factor? Discuss the probability of occupation of various energy states by electrons at $T = 0^\circ\text{K}$ and $T > 0^\circ\text{K}$ on the basis of Fermi factor. (06 Marks)
b. What is Meissner effect? Explain the working of maglev. (06 Marks)
c. The electron mobility and hole mobility of silicon are $0.17\text{m}^2/\text{volt-sec}$ and $0.035 \text{ m}^2/\text{volt-sec}$ respectively at room temperature. If the carrier density is known to be $1.1 \times 10^{16}/\text{m}^3$, calculate the resistivity of silicon semiconductor material. (04 Marks)

Module-3

- 5 a. Derive the expression for energy density of radiation in terms of Einstein's coefficients. (06 Marks)
b. With neat diagrams explain the different types of optical fibers. (06 Marks)
c. A medium in thermal equilibrium at temperature 300K has two energy levels with a wavelength separation of $1\mu\text{m}$. Find the ratio of population densities of the upper and lower levels. (04 Marks)

OR

- 6 a. What is Holography? With a neat diagram, explain the construction, reconstruction of Hologram. (06 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.

- b. What is numerical aperture? Obtain an expression for numerical aperture in terms of refractive indices of core and cladding. (06 Marks)
- c. The attenuation of light in an optical fiber is 3.6dB/km, what fraction of its initial intensity remains after i) 1km ii) 3km? (04 Marks)

Module-4

- 7 a. What are Miller indices? Derive the expression for the interplanar spacing in terms of Miller indices. (06 Marks)
- b. Describe the construction and working of Bragg's X-ray spectrometer. (06 Marks)
- c. First order Bragg reflection occurs when a monochromatic beam of X-rays of wavelength 0.675\AA is incident on a crystal at a glancing angle of $4^{\circ}51'$. What is the glancing angle for third order Bragg reflection to occur? (04 Marks)

OR

- 8 a. Define coordination number and atomic packing factor. Calculate the coordination number for sc, bcc and fcc structures. (07 Marks)
- b. Derive Bragg's law. (05 Marks)
- c. Draw the crystal planes (100) (200) (001) and (011) in a cubic unit cell. (04 Marks)

Module-5

- 9 a. What is Mach number? Distinguish between acoustic, ultrasonic, subsonic and supersonic waves. (05 Marks)
- b. What are nanomaterials? Explain the Sol – Gel method of synthesis of nano-materials. (07 Marks)
- c. In a scanning electron microscope, electrons are accelerated by an anode potential difference of 60kV. Estimate the wavelength of the electron in the scanning beam. (04 Marks)

OR

- 10 a. What is a shock wave? Describe the construction and working of Reddy's shock tube. (07 Marks)
- b. What is a carbon nano tube? Explain how it is synthesized using pyrolysis method. (05 Marks)
- c. Mention the principle and three applications of SEM. (04 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.
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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15MAT11

First Semester B.E. Degree Examination, Dec.2017/Jan.2018
Engineering Mathematics – I

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Find the n^{th} derivative of $y = e^{-x} \sin x \cos 2x$. (06 Marks)
 b. Show that the curves $r = a(1 + \cos\theta)$ and $r = b(1 - \cos\theta)$ cut each other orthogonally. (05 Marks)
 c. Find the radius of curvature of the curve $x^2y = a(x^2 + y^2)$ at the point $(-2a, 2a)$. (05 Marks)

OR

- 2 a. If $y = \sin(m \sin^{-1} x)$, then prove that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$ (06 Marks)
 b. Find the pedal equation of $r = 2(1 + \cos\theta)$. (05 Marks)
 c. Find the radius of curvature of $r^n = a^n \sin n\theta$. (05 Marks)

Module-2

- 3 a. Expand $\tan^{-1} x$ in powers of $(x - 1)$ upto the fourth degree term. (06 Marks)
 b. Evaluate $\lim_{x \rightarrow 0} \left[\frac{1}{x} - \frac{\log(1+x)}{x^2} \right]$ (05 Marks)
 c. If $z = f(x + ct) + g(x - ct)$, prove that $\frac{\partial^2 z}{\partial t^2} = C^2 \cdot \frac{\partial^2 z}{\partial x^2}$. (05 Marks)

OR

- 4 a. Obtain the Maclaurin's series expansion of $e^{\sin x}$ upto the form containing x^4 . (06 Marks)
 b. If $z = \log\left(\frac{x^4 + y^4}{x + y}\right)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$. (05 Marks)
 c. If $u = x^2 + y^2 + z^2$, $v = xy + yz + zx$, $w = x + y + z$, show that $\frac{\partial(u, v, w)}{\partial(x, y, z)} = 0$. (05 Marks)

Module-3

- 5 a. A particle moves along the curve whose parametric equations are $x = t^3 + 1$, $y = t^2$ and $z = 2t + 5$. Find the components of its velocity and acceleration at time $t = 1$ in the direction of $i + j + 3k$. (06 Marks)
 b. If $\phi = 2x^3y^2z^4$, find $\text{Div}(\text{Grad } \phi)$. (05 Marks)
 c. Show that $\vec{F} = (y + z)i + (z + x)j + (x + y)k$ is irrotational. Also find a scalar function ϕ , such that $\vec{F} = \nabla\phi$. (05 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. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at $P(1, -2, -1)$ in the direction of $2i - j - 2k$. (06 Marks)
- b. If $\vec{F} = (x + y + 1)i + j - (x + y)k$. Show that $\vec{F} \cdot \text{curl } \vec{F} = 0$. (05 Marks)
- c. If $\vec{F} = \nabla(xy^3z^2)$, find $\text{div } \vec{F}$ and $\text{curl } \vec{F}$ at the point $(1, -1, 1)$. (05 Marks)

Module-4

- 7 a. Obtain the reduction formula for $\int \cos^n x dx$. (06 Marks)
- b. Solve $ye^{xy} dx + (xe^{xy} + 2y)dy = 0$. (05 Marks)
- c. Find the orthogonal trajectories of the family of curves $y^2 = Cx^3$. (05 Marks)

OR

- 8 a. Evaluate $\int_0^1 x^{3/2}(1-x)^{3/2} dx$. (06 Marks)
- b. Solve $\frac{dy}{dx} - \frac{2}{x}y = \frac{y^2}{x^3}$. (05 Marks)
- c. A body is heated to 110°C and placed in air at 10°C . After one hour its temperature becomes 60°C . How much additional time is required for it to cool to 30°C ? (05 Marks)

Module-5

- 9 a. Find the rank of the matrix $A = \begin{bmatrix} 4 & 0 & 2 & 1 \\ 2 & 1 & 3 & 4 \\ 2 & 3 & 4 & 7 \\ 2 & 3 & 1 & 4 \end{bmatrix}$. (06 Marks)
- b. Solve the following system of equations by Gauss Jordan method:
 $x + 2y + z = 3$, $2x + 3y + 3z = 10$, $3x - y + 2z = 13$ (05 Marks)
- c. Reduce the matrix $A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$ to the diagonal form. (05 Marks)

OR

- 10 a. Solve the following system of equations by Gauss-Seidal method:
 $20x + y - 2z = 17$, $3x + 20y - z = -18$, $2x - 3y + 20z = 25$. Perform three iterations. (06 Marks)
- b. Show that the transformation, $y_1 = 2x_1 - 2x_2 - x_3$, $y_2 = -4x_1 + 5x_2 + 3x_3$, $y_3 = x_1 - x_2 - x_3$ is regular and find the inverse transformation. (05 Marks)
- c. Reduce the quadratic form,
 $3x^2 + 3y^2 + 3z^2 + 2xy - 2yz + 2zx$ into the canonical form. (05 Marks)
