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06MAT11

NEW SCHEME

First Semester B.E. Degree Examination, Dec. 06 / Jan. 07
Common to All Branches
Engineering Mathematics – I

Time: 3 hrs.] [Max. Marks:100

Note: ***Attempt any FIVE full questions choosing atleast TWO questions from each part.***

PART A

1 a. If $y = \log_{10}\left[(1-2x)^3(8x+1)^5\right]$ find y_n. **(07 Marks)**

b. If $y = \log\left(x+\sqrt{1+x^2}\right)$ show that $(1+x^2)y_{n+2} + (2n+1)xy_{n+1} + n^2 y_n = 0$. **(07 Marks)**

c. Find the pedal equation of the curve $r = ae^{m\theta}$. **(06 Marks)**

2 a. State and prove Euler's theorem for f(x, y), a homogenous function of degree n, and prove that $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2} = n(n-1)f(x,y)$. **(07 Marks)**

b. If $u = x \log(xy)$ where $x^3 + y^3 + 3xy = 1$, find $\frac{dy}{dx}$ and hence find $\frac{du}{dx}$. **(07 Marks)**

c. If $u = x^2 - y^2$, $v = 2xy$ and $x = r\cos\theta$, $y = r\sin\theta$, determine the value of the Jacobian $\frac{\partial(u,v)}{\partial(r,\theta)}$. **(06 Marks)**

3 a. Using the reduction formula, evaluate $\int \tan^6 x\,dx$. **(07 Marks)**

b. If n is a positive integer, show that $\int_0^{2a} x^n\sqrt{2ax - x^2}\,dx = \frac{(2n+1)!}{(n+2)!\,n!}\cdot\frac{a^{n+2}}{2^n}\pi$. **(07 Marks)**

c. Trace the curve $r^2 = a^2\cos 2\theta$. **(06 Marks)**

4 a. If $x = a(\cos\theta + \theta\sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$, find $\frac{ds}{d\theta}$. **(07 Marks)**

b. Find the area between the curve $x^2y^2 = a^2(y^2 - x^2)$ and its asymptotes $x = \pm a$. **(07 Marks)**

c. By differentiation under integral sign, show that $\int_0^{\pi}\frac{\log(1+a\cos x)}{\cos x}dx = \pi\sin^{-1}a$. **(06 Marks)**

Contd.... 2

PART B

5 a. Solve $\frac{dy}{dx} = (4x + y + 1)^2$. **(07 Marks)**

b. Solve $y' = \frac{xy^2 - 1}{1 - x^2 y}$. **(07 Marks)**

c. Find the orthogonal trajectories of the family of circles $x^2 + y^2 = 2cx$. **(06 Marks)**

6 a. Discuss the nature of the series:

$$\frac{x}{1} + \frac{1}{2}\cdot\frac{x^3}{3} + \frac{1.3}{2.4}\frac{x^5}{5} + \frac{1.3.5}{2.4.6}\frac{x^7}{7} + \text{---------}\infty. \quad x>0$$ **(07 Marks)**

b. Find the nature of the series:

$$\frac{3}{4}x + \left(\frac{4}{5}\right)^2 x^2 + \left(\frac{5}{6}\right)^3 x^3 + \text{---------}\infty. \quad x>0$$ **(07 Marks)**

c. Test the series $1 - \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} - \frac{1}{4\sqrt{4}} + \text{------}\infty$ for absolute convergence. **(06 Marks)**

7 a. Find the equation of the line drawn through the point (1, 0, -1) and intersecting the lines $x = 2y = 2z$ and $3x + 4y = 1$, $4x + 5z = 2$. **(07 Marks)**

b. Find the equations of the two planes which bisect the angles between the planes $3x - 4y + 5z = 3$, $5x + 3y - 4z = 9$. Also point out which of the planes bisect the acute angle. **(07 Marks)**

c. Find the magnitude and the equations of the shortest distance between the lines $\frac{x}{2} = \frac{y}{-3} = \frac{z}{1}$ and $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$. **(06 Marks)**

8 a. Find the tangential and normal components of acceleration of a particle moving along curve $x(t) = t^2$, $y(t) = -t^3$, $z(t) = t^4$ at $t = 1$. **(07 Marks)**

b. If $\vec{F} = \text{grad}\left(x^3y + y^3z + z^3x - x^2y^2z^2\right)$ find $\text{div}\,\vec{F}$ and $\text{curl}\,\vec{F}$ at (1, 2, 3). **(07 Marks)**

c. Prove that curl (gradφ) = 0. **(06 Marks)**

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06CHE12/22

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NEW SCHEME

I/II Semester B.E. Degree Examination, Dec.06/Jan. 07
Common to all Branches
Engineering Chemistry

Time: 3 hrs.] [Max. Marks:100

Note: ***Answer any FIVE full questions, choosing at least TWO questions from each Part A and Part B.***

PART A

1 a. Distinguish between gross and net calorific value of a fuel. **(04 Marks)**

b. What is meant by cracking of petroleum? Explain fluidized bed catalytic cracking. **(07 Marks)**

c. On burning 0.96 grams of a solid fuel in Bomb calorimeter, the temperature of 3,500 grams of water increased by 2.7^0C. Water equivalent of calorimeter and latent heat of steam are 385 grams and 587 cals/gram respectively. If the fuel contains 5% H2, calculate its gross and net calorific values. **(06 Marks)**

d. Write a note on power alcohol. **(03 Marks)**

2 a. Define electrode potential and derive Nernst equation for electrode potential. **(05 Marks)**

b. What are the advantages of secondary reference electrodes? Explain the construction and working of Ag/AgCl electrode. **(06 Marks)**

c. What are electrochemical cells? Distinguish primary cells from secondary cells with examples. **(05 Marks)**

d. What are concentration cells? Calculate cell potential of the following cell at 298 k.
$Ag \mid Ag^+ (0.001M) \mid\mid Ag^+ (0.50\ M) \mid Ag$.
What will be cell potential, when the concentration of silver ions in the above cell is changed from 0.001M to 0.0005 M at same temperature? **(04 Marks)**

3 a. How does a fuel cell differ from battery? Explain the construction and working of Nickel – metal hydride battery. **(08 Marks)**

b. Explain the construction, working and application of H_2-O_2 fuel cell, with cell reaction. **(06 Marks)**

c. Give the classification of batteries with examples. **(06 Marks)**

4 a. Explain stress corrosion with examples. **(04 Marks)**

b. What are corrosion inhibitors? Explain how corrosion is controlled by using anodic and cathodic inhibitors? **(07 Marks)**

c. Write a brief note on the effect of following factors on the rate of corrosion
i) Nature of metal ii) Hydrogen – over voltage iii) Relative areas of anode and cathode. **(09 Marks)**

Contd... 2

PART B

5 a. What is electroplating? Give the technological importance of metal finishing. **(04 Marks)**

b. Explain the following factors influencing the nature of deposit : i) Complexing agents ii) Brighteners iii) Levellers and iv) Wetting agents. **(08 Marks)**

c. Discuss the electroless plating of copper on PCB. **(04 Marks)**

d. Write a note on over voltage governing the metal finishing. **(04 Marks)**

6 a. Explain the following with examples
i) Thermotropic liquid crystal and ii) Lyotropic liquid crystal. **(06 Marks)**

b. What is homologues series? Explain the liquid crystalline behavior of homologues of MBBA. **(06 Marks)**

c. Discuss the instrumentation and applications of conductometric estimation. **(08 Marks)**

7 a. What are adhesives? Explain the synthesis and applications of epoxy resin. **(06 Marks)**

b. What are elastomers? Mention the advantages of synthetic elastomers. **(04 Marks)**

c. Give the synthesis and applications of butyl rubber. **(04 Marks)**

d. Discuss the mechanism of conductance in polyacetylene. **(06 Marks)**

8 a. What is potable water? Discuss the purification of water by reverse osmosis process. **(05 Marks)**

b. Explain the method of determining sulphate content in water by grarimetric method. **(05 Marks)**

c. Explain the determination of dissolved oxygen by Winkler method. Give the reactions involved. **(06 Marks)**

d. Describe the secondary treatment of sewage by activated sludge process. **(04 Marks)**

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06PHY12/22

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NEW SCHEME

I/II Semester B.E. Degree Examination, Dec.06 / Jan.07
Common to all Branches
Engineering Physics

Time: 3 hrs.] [Max. Marks:100

Note: *1. Answer any FIVE questions choosing at least two questions from each part*

List of Constants:

i) Velocity of light $C = 3 \times 10^8$ m/s.
ii) Planck's constant = $h = 6.626 \times 10^{-34}$ Js.
iii) Mass of neutron = 1.67×10^{-27} kg.
iv) Boltzmann constant = 1.38×10^{-23} J/K.
v) Electron mass = 9.11×10^{-31} kg.
vi) Electrons charge = 1.6×10^{-19} C.
vii) $\in_0$ permittivity of vacuum = 8.85×10^{-12} Fm^{-1}.

Part A

1 a. Discuss Planck's radiation law. **(05 Marks)**

b. Explain the duality of matter waves from the inferences drawn from photoelectric effect and Davisson-Germer effect. **(05 Marks)**

c. Define group velocity and obtain an expression for the same. **(05 Marks)**

d. A particle of mass 0.5 Mev/C^2 has kinetic energy 100 ev. Find its de-Broglie wavelength, where C is the velocity of light. **(05 Marks)**

2 a. Show that electrons cannot exist in the nucleus of an atom. **(07 Marks)**

b. An electron has a speed of 6×10^5 m/s with an inaccuracy of 0.01%. With what fundamental accuracy can we locate the position of the electron? **(05 Marks)**

c. Discuss the wave functions, probability densities and energy levels for a particle in a box. **(08 Marks)**

3 a. State Mathiessien's rule and give an account of the nature of total resistivity both at high and low temperatures. **(05 Marks)**

b. Using the free electron model derive an expression for electrical conductivity in metals. **(07 Marks)**

c. Explain density of states. **(03 Marks)**

d. Calculate the drift velocity and thermal energy of electrons in a metal of thickness 1 mm across which a potential difference of 1 volt is applied, at the temperature of 300 K. The mobility of free electron is 40 cm^2/v-s. **(05 Marks)**

4 a. Explain briefly the various types of polarization. **(08 Marks)**

b. Derive an expression for internal field in case of liquids and solids. **(08 Marks)**

c. What is the polarization produced in sodium chloride by an electric field of 600 v/mm if it has a dielectric constant of 6? **(04 Marks)**

Contd....2

Part B

5 a. Explain with sketches the basic principle of operation of lasers. **(08 Marks)**

b. Describe the construction and working of He-Ne laser, with energy level diagram. **(08 Marks)**

c. A laser medium at thermal equilibrium temperature 300 K has two energy levels with a wavelength separation of 1 μm. Find the ratio of population densities of the upper and lower levels. **(04 Marks)**

6 a. Explain in brief Type-I and Type-II super conductors. How does a super conductor differ from a normal conductor? **(10 Marks)**

b. What is attenuation in an optical fibre? Explain the attenuation mechanisms. **(05 Marks)**

c. The attenuation of an optical fibre is -3.6 dB/km. What is the fraction of light intensity that remains after i) 1 km ii) after 3 km? **(05 Marks)**

7 a. Define crystal lattice, unit cell and primitive cell. **(06 Marks)**

b. What is atomic packing factor? Work out atomic packing factors for simple cubic, FCC and BCC structures. **(10 Marks)**

c. Calculate the glancing angle on the cube (132) of NaCl, having lattice spacing 3.81A°, corresponding to the second order diffraction for x-rays of wavelength 0.58A°. **(04 Marks)**

8 a. What are nanomaterials? Write a note on carbon nanotubes. **(06 Marks)**

b. What is non-destructive testing? Explain with principle how flow in a solid can be detected by non-destructive method using ultrasonics? **(07 Marks)**

c. Explain "scaling laws". Explain scaling of classical mechanical systems along with two examples and the assumptions involved in it. **(07 Marks)**

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06CCP13/23

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NEW SCHEME

I/II Semester B.E. Degree Examination, Dec.06/Jan. 07
Common to all Branches
Computer Concepts and C Programming

Time: 3 hrs.] [Max. Marks:100

Note: ***Answer any FIVE full questions selecting at least TWO full questions from each part.***

PART A

1 a. With a neat diagram, explain the functional organization of a digital computer. **(10 Marks)**

b. Discuss the operation of the following devices
i) Pen ii) Game Controller iii) Touch Screen. **(10 Marks)**

2 a. With examples define data and information. **(10 Marks)**

b. Distinguish between primary memory and secondary memory. Give examples. **(10 Marks)**

3 a. Briefly explain the classification of operating systems, with examples of each. **(08 Marks)**

b. Explain the features of LINUX operating system. **(06 Marks)**

c. With the help of an example, illustrate how e-mails are sent and received. **(06 Marks)**

4 a. Discuss the various simple data types supported in C language. Mention their range and size. **(08 Marks)**

b. Classify operators in C language based on number of operands. Give suitable examples. **(06 Marks)**

c. Compare and contrast algorithms and flow charts. **(06 Marks)**

PART B

5 a. Write a C program to find whether given number is prime or not. Output the given number with suitable message. **(08 Marks)**

b. Explain the following with examples and flow chart.
i) Simple 'if' iii) 'Nested if'
ii) 'Go to' iv) 'if … else' ladder. **(12 Marks)**

6 a. With syntax, flow chart and example, explain the working of 'for' loop. **(08 Marks)**

b. Write a program using 'while' loop to compute the following series.
$1 + x + x^2 + \ldots. x^n$ for a given value of n. **(08 Marks)**

c. Write a note on using 'go to' in loops. **(04 Marks)**

7 a. Write a C program to generate Fibonacci numbers using arrays. **(12 Marks)**

b. Write a C program to read n elements of a one dimensional array and find the largest of them. **(08 Marks)**

8 a. Discuss the necessity of user defined functions in developing a program. **(08 Marks)**

b. Write a function that finds the smallest of 4 numbers in an array n. Use it in a main function to find the smallest of arrays A, B, C and D each with 4 elements. **(12 Marks)**

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NEW SCHEME

I/II Semester B.E. Degree Examination, Dec. 06 / Jan. 07
Common to All Branches
Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. List the various civil engineering amenities covered under infrastructural development. **(06 Marks)**

b. What are the different bases under which the dams are classified? **(08 Marks)**

c. Write short notes on :
   i) Shoulders
   ii) Kerbs **(06 Marks)**

2 a. State the Newton's three laws of motion. **(06 Marks)**

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

c. A force of 200 N is acting on a block as shown in Fig.2(c), find the components of forces along the horizontal and vertical axes. **(05 Marks)**

d. Find the moment of force F = 600 N about 'a' as shown in Fig.2(d). **(05 Marks)**

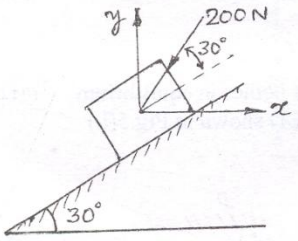

Fig.2(c)

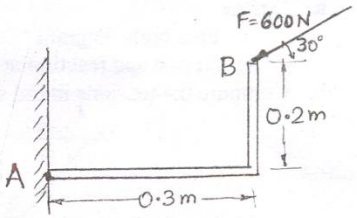

Fig.2(d)

3 a. State and explain parallelogram law of forces. **(05 Marks)**

b. Determine the resultant force acting on the structure at point 'O' both in magnitude and direction. Refer Fig.3(b)

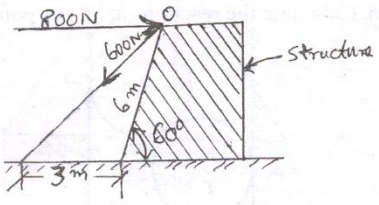

Fig.3(b)

(07 Marks)

Contd.... 2

c. Determine the magnitude, direction of the resultant force for the force system shown in Fig.3(c). Locate the resultant force with respect to point 'D'.

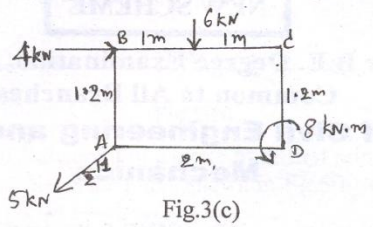

Fig.3(c) **(08 Marks)**

4 a. Define centroid and centroidal axis. **(04 Marks)**

b. Derive an expression for the co-ordinates for the position of centroid of rectangle. **(08 Marks)**

c. Determine the position of centroid with respect to '0'

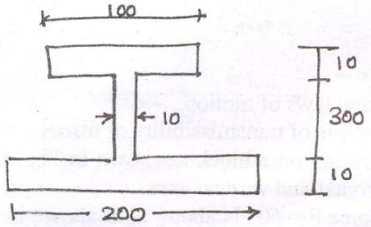

Fig.4(c) All dimensions are in mm **(08 Marks)**

5 a. Define :

i) Free body diagram

ii) Action and reaction at a point of contact of bodies in equilibrium. **(04 Marks)**

b. Compute the tensions in the strings AB, BC and CD shown in Fig.5(b).

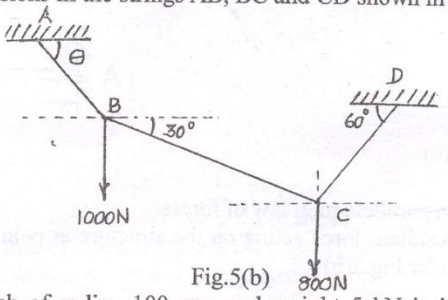

Fig.5(b) **(06 Marks)**

c. Two spheres each of radius 100 mm and weight 5 kN is in a rectangular box as shown in Fig.5(c). Calculate the reactions at all the points of contact.

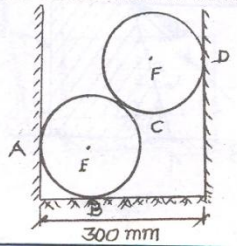

Fig 5(c) **(10 Marks)**

Contd.... 3

6 a. Determine the distance x such that the reactions R_A an R_B are equal, for the beam shown in Fig.6(a).

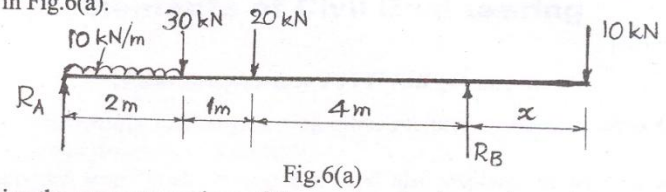

Fig.6(a)

(08 Marks)

b. Determine the support reactions of the overhanging beam shown in Fig.6(b).

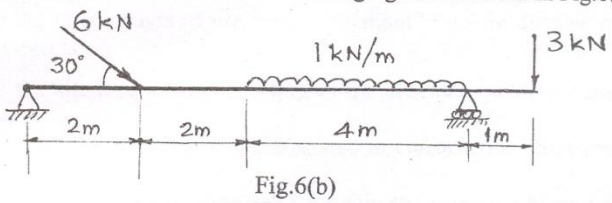

Fig.6(b)

(12 Marks)

7 a. Distinguish between

i) Dry friction and fluid friction

ii) Static friction and kinetic friction.

(08 Marks)

b. Determine the force P required to start the movement of the wedge as shown in Fig.7(b). The angle of friction for all surfaces of contact is 15^0.

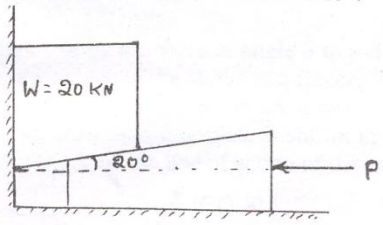

Fig.7(b)

(12 Marks)

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 and radii of gyration of the area shown in Fig.8(b) about the base AB and the centroidal axis parallel to AB.

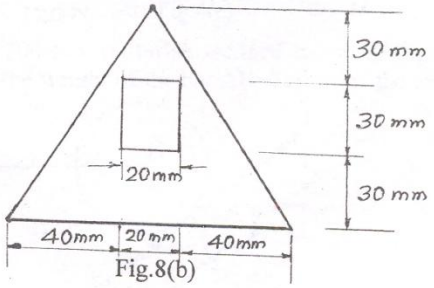

Fig.8(b)

(14 Marks)

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06EME14/06EME24

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NEW SCHEME

First Semester B.E. Degree Examination, Dec. 06 / Jan. 07
Common to all Branches
Elements of Mechanical Engineering

Time: 3 hrs.] [Max. Marks:100

Note: *Answer any FIVE full questions picking at least TWO questions from each PART A and PART B.*

PART A

1 a. What are renewable and non-renewable sources of energy? Discuss the advantages and disadvantages of renewable over conventional sources of energy. **(08 Marks)**

b. Define the following terms:
i) Dryness fraction ii) Specific volume iii) Latent heat. **(06 Marks)**

c. Find the enthalpy of 0.5 kg of steam at a pressure of 10 bar absolute for the following conditions:
i) It is 1.5% wet ii) It is dry saturated iii) It is at a temperature of 200^0C.
Assume specific heat as 2.3 kJ/kgK. **(06 Marks)**

2 a. What is compounding? With a suitable diagram explain velocity compounding. **(10 Marks)**

b. Differentiate between impulse and reaction water turbines. **(05 Marks)**

c. Explain the working of closed cycle gas turbines. **(05 Marks)**

3 a. What are the different efficiencies of an IC engine? Define each one of them with equations. **(06 Marks)**

b. Derive an expression for the thermal efficiency (η_{th}) of an engine working on an Otto-cycle. **(09 Marks)**

c. Calculate the brake power output of a single cylinder four stroke petrol engine which is running at a speed of 400 rpm. The load on the brake drum is 24 kg and the spring balance reads 4 kg. The diameter of the brake drum is 600 mm and the rope diameter is 30 mm. **(05 Marks)**

4 a. What are the desirable properties of the refrigerant? **(04 Marks)**

b. With a neat sketch explain the construction and working of a vapour absorption refrigeration system. **(10 Marks)**

c. Differentiate between refrigeration and air conditioning. **(06 Marks)**

PART B

5 a. With the help of a neat diagram explain the different parts of a lathe. **(10 Marks)**

b. Give an account of drilling machine classification and general specification. **(10 Marks)**

6 a. Draw a neat and labeled sketch of a horizontal milling machine. State the function of each part. **(08 Marks)**

b. How is a milling machine specified? **(04 Marks)**

c. How are abrasives classified? Give examples for each type. **(04 Marks)**

d. Compare between up milling and down milling. **(04 Marks)**

7 a. Differentiate between consumable and non consumable electrodes. **(05 Marks)**

b. State the advantages of coated electrodes. **(05 Marks)**

c. What are the advantages of antifriction bearings? Give their applications. **(10 Marks)**

8 a. Two pulleys are connected by a belt drive. The tensions in the slack side and tight side are 800 N and 1200 N respectively. The diameter of the driven pulley is 1 meter and its speed is 240 rpm. Determine the power transmitted. **(10 Marks)**

b. What is a gear train? Explain simple and compound gear trains. **(10 Marks)**

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06ELN15/25

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NEW SCHEME

First / Second Semester B.E. Degree Examination, Dec.06 / Jan.07
Common to all Branches
Basic Electronics

Time: 3 hrs.] [Max. Marks:100

Note: ***1. Answer any FIVE questions selecting at least two questions from each part***

Part A

1 a. Explain the operation of a half-wave rectifier with capacitor filter with the help of a circuit diagram and relevant waveforms. **(08 Marks)**

b. With a neat circuit diagram, explain Zener diode voltage regulator. **(06 Marks)**

c. A full-wave bridge rectifier supplies a load of 400 Ω in parallel with a capacitor of 500 μF. If the ac supply voltage is $230\sin 314t$ V, find the
i) Ripple factor and
ii) DC load current. **(06 Marks)**

2 a. Draw the input and output characteristics curve of a transistor in common-emitter configuration. Explain their nature and shape. What do their slope represent? **(07 Marks)**

b. What are the different current components in the three regions of a transistor when it is functioning in active region? Depict them in suitable diagrams giving their origin. **(06 Marks)**

c. For the circuit shown below, the parameters are V_{BB} = 1.5 V, R_B = 580 kΩ, V_{CC} = 5 V, V_{EB} (on) = 0.6 V and β = 100. Find I_B, I_C, I_E and R_C such that $V_{EC} = \frac{1}{2}(V_{CC})$. **(07 Marks)**

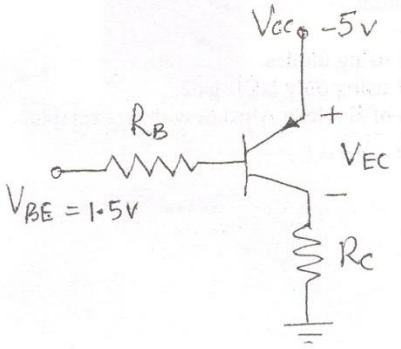

Fig. Q2 (c)

3 a. What is a DC load line? **(02 Marks)**

b. List the different biasing circuits and explain collector-base bias circuit. **(10 Marks)**

c. For the base bias circuit for a npn transistor find I_B, I_C and V_{CE}, if R_C = 2.2 kΩ, R_B = 470 kΩ, V_{CC} = 18 V, h_{FE} = 100, V_{BE} = 0.7 V. Draw the DC load line and indicate the Q point. **(08 Marks)**

4 a. With respect to SCR, define the following :
   i) Holding current I_H.
   ii) Gate trigger voltage V_{GT}.
   iii) Peak forward voltage V_{DRM}.
   iv) Maximum RMS current I_T(rms). **(06 Marks)**

b. Sketch the typical UJT emitter characteristics for $I_{B_2} = 0$, $V_{B_1}V_{B_2} = 20$ V and $V_{B_1}V_{B_2} = 5$ V. Identify each region and important points on the characteristics. **(06 Marks)**

c. Draw the complete equivalent circuit of a JFET. Explain each component. **(08 Marks)**

Part B

5 a. Compare positive feedback amplifier with negative feedback amplifier with the help of a neat block diagram. **(12 Marks)**

b. Calculate the frequency of oscillations of the Hartley Oscillator which has $L_1 = 0.5$ mH, $L_2 = 1$mH and $C = 0.2\ \mu F$. What should be the value of C, if the frequency of oscillation were to be 12 kHz with other components of the circuit intact? **(08 Marks)**

6 a. Describe an Op-Amp and its important characteristics. **(06 Marks)**

b. What is saturating property of an Op-Amp? Mention the typical value if saturating output voltage for an IC-741 Op-Amp operating at ± 12 V DC supply. **(06 Marks)**

c. With a neat diagram explain the internal structure of a cathode ray oscilloscope. Explain the different sections and the various electrodes. **(08 Marks)**

7 a. Convert $(3576)_8$ to hexadecimal. **(05 Marks)**

b. Convert $(725.25)_8$ to its decimal and binary equivalent. **(05 Marks)**

c. Subtract $(111001)_2$ from $(101011)_2$ using 2's compliment method. **(05 Marks)**

d. For an AM, amplitude of modulating signal is 0.5 V and carrier amplitude is 1 V. Find modulation index. **(05 Marks)**

8 a. Realize AND gate using diodes. **(05 Marks)**

b. Implement XNOR using only NOR gate. **(05 Marks)**

c. List the properties of Boolean Algebra with an example. **(05 Marks)**

d. Prove that $\overline{\overline{AB} + \overline{A} + AB} = 0$. **(05 Marks)**

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NEW SCHEME

I/II Semester B.E. Degree Examination, Dec. 06 / Jan. 07
Common to All Branches
Basic Electrical Engineering

Time: 3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions choosing at least TWO full questions from each part.***

Part A

1 a. Define RMS value of an alternating quantity. Obtain an expression for it in terms of maximum value. **(06 Marks)**

b. Given $v = 200 \sin 377t$ volts and $i = 8 \sin (377t - 30^0)$ amps for an a.c. circuit, determine :

i) Power factor
ii) True power
iii) Apparent power
iv) Reactive power

Indicate the unit of power calculated. **(08 Marks)**

c. A circuit consists of resistance 10 Ω, an inductance of 16 mH and a capacitance of 150 μF connected in series. A supply of 100 V at 50 Hz is given to the circuit. Find the current, power factor and power consumed by the circuit. **(06 Marks)**

2 a. For the current wave shown in Fig.2(a)

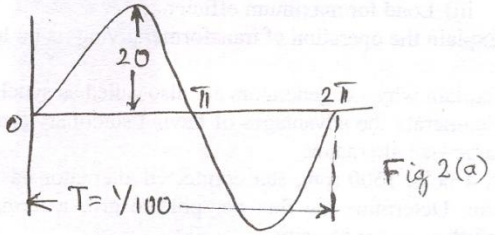


Fig 2(a)

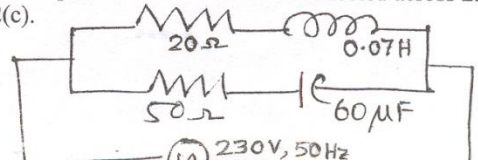
Find

i) Peak current
ii) Average value
iii) Frequency
iv) Periodic time
v) Instantaneous value at t = 3 ms. **(06 Marks)**

b. For a R-L-C series circuit, discuss the nature of power-factor for

i) $X_L > X_C$ ii) $X_L < X_C$ iii) $X_L = X_C$ **(06 Marks)**

c. A circuit having a resistance 20 Ω and inductance of 0.07 H is connected in parallel with a series combination of 50 Ω resistance and 60 μF capacitance. Calculate the total current, when the parallel combination is connected across 230 V, 50 Hz, supply as shown in Fig.2(c). **(08 Marks)**



Contd.... 2

3 a. Explain generation of 3-ϕ voltages in an alternator. **(04 Marks)**

b. Define balanced load and phase sequence. **(04 Marks)**

c. Three similar choking coils each having resistance 10 Ω and reactance 10 Ω are connected in star across a 440 V, 3 phase supply. Find line current and reading of each of two wattmeters connected to measure power. **(12 Marks)**

4 a. Explain with neat sketch construction and principle of operation of "Dynamometer type wattmeter". **(10 Marks)**

b. What is the necessity of earthing? Explain any one type of earthing. **(06 Marks)**

c. What is fuse? Why is it used in electric circuits? **(04 Marks)**

Part B

5 a. Explain the different characteristics of a DC shunt motor. **(08 Marks)**

b. Why starter is needed? Explain 3-point starter used for DC motors. **(07 Marks)**

c. A separately excited DC generator when running at 1000 rpm supplies 50 A at 250 V. Find how much current it will deliver when the speed falls to 800 rpm. Take armature resistance as 0.01 Ω and brush drop of 1 V/brush. **(05 Marks)**

6 a. In a transformer the iron loss is the constant loss and copper loss is the variable loss. Justify. How are they minimized? **(06 Marks)**

b. A 40 kVA single phase transformer has core loss of 450 W and full load copper loss of 850 W. If the power factor of the load is 0.8 calculate :

i) Full load efficiency

ii) Maximum efficiency at upf

iii) Load for maximum efficiency. **(08 Marks)**

c. Explain the operation of transformer giving its no load vector diagram. **(06 Marks)**

7 a. Explain why a.c. generators are also called as synchronous generators. **(04 Marks)**

b. Enumerate the advantages of having stationary armature and rotating field system in large size alternator. **(06 Marks)**

c. A 4 pole, 1500 rpm, star connected alternator has 9 slots/pole and 8 conductors per slot. Determine the flux per pole to give a terminal voltage of 3300 V. Take the winding factor as unity. **(10 Marks)**

8 a. Explain the concept of rotating magnetic field in an induction motor. **(08 Marks)**

b. Explain why an induction motor draws high current during starting. **(06 Marks)**

c. A 12 pole, 3 phase alternator is coupled to an engine running at 500 rpm. It supplies an induction motor, which has a full load speed of 1440 rpm. Find the percentage slip and the number of poles of the motor. **(06 Marks)**

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Test Booklet Version : A

I/II Semester B.E Degree Examination, December.06 / January.07
CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS
(COMMON TO ALL BRANCHES)

Time: 3 hrs.] [Max. Marks:100

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing / darkening the circles.
2. Correctly enter your USN at the appropriate place on the **OMR** sheet supplied.
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7. **All questions are compulsory and carry equal marks.**

10. No code will give …… to get solutions for ethical problems
    a) Guide lines.
    b) Set of ideas.
    c) An algorithm.
    d) Ethical standards.

11. In the Indian constitution, the fundamental rights
    a) Were added by the first amendment.
    b) Were added by the 42nd amendment.
    c) Formed a part of the original constitution.
    d) None of the above.

12. Which of the following is not considered as the aim of engineering ethics?
    a) Moral imagination.
    b) Identification of ethical issues.
    c) Development of analytical skills.
    d) Shifting of responsibility.

13. The fundamental rights granted by the Indian constitution to its citizens cannot be suspended
    a) Except by an order of the President during national emergency.
    b) Except through an order of the President during war.
    c) Except by an order of the Supreme Court.
    d) Under any circumstances.

14. Which of the following is no longer a fundamental right?
    a) Right to liberty.
    b) Right to equality.
    c) Right to freedom of religion.
    d) Right to property.

15. In ……. concept of responsibility, an attention is paid to those who are at the risk of being harmed
    a) Minimalist.
    b) Reasonable care.
    c) Good works views.
    d) All of the above.

16. The constitution of India says 'untouchability' is abolished and its practice in any form is prohibited. This is provided under
    a) Right to equality.
    b) Right to liberty.
    c) Right against exploitation.
    d) Right to constitutional remedies.

17. The main purpose of including directive principles of state policy in the constitution of India is
    a) To check the arbitrary action of the government.
    b) To establish a secular state.
    c) To establish a welfare state.
    d) To provide opportunities for the development.

18. Which of the following writ issued by the Supreme Court if it sends an order to restrain a person from acting in an office to which he is not entitled?
    a) Certiorari.
    b) Quo Warranto.
    c) Habeas corpus.
    d) Prohibition.

19. No person who is arrested shall be detained in custody without being informed
    a) Of the time when he will be produced before the magistrate.
    b) On the grounds for such arrest.
    c) Of the orders of the court.
    d) None of the above.

20. Fear is ..... to responsibility
    a) A way to shift.
    b) An impediment.
    c) A way to corrupt.
    d) Both (a) and (c).

21. As applied to engineering research and testing, retaining the data to draw a non-contradictory statement, discarding the rest is called
    a) Cooking.
    b) Trimming.
    c) Scanning.
    d) Skimming.

22. Fundamental duties were incorporated in the constitution by the .....
    a) 42nd Amendment Act, 1976.
    b) 44th Amendment Act, 1978.
    c) 45th Amendment Act, 1980.
    d) 46th Amendment Act, 1982.

23. The President of India may from time to time
    a) Dissolve the Rajya Sabha.
    b) Adjourn the Rajya Sabha.
    c) Dissolve the Lok Sabha.
    d) Adjourn the Lok Sabha.

24. Presidents rule can be imposed in the states
    a) During the national emergency.
    b) During general elections.
    c) On failure of the constitutional machinery in a state.
    d) All of the above.

25. Which of the following is not the conflict of interest as applied to making professional judgement
    a) Virtual.
    b) Actual.
    c) Apparent.
    d) Potential.

26. The minimum age prescribed for the membership of the Rajya Sabha is
    a) 25 years.
    b) 30 years.
    c) 35 years.
    d) 40 years.

27. Which of the following is not done by the President?
    a) Prorogation of the houses of parliament.
    b) Summoning the houses of parliament to meet.
    c) Adjournment of the houses of parliament.
    d) Dissolving the Lok Sabha.

28. No person can contest elections for the membership of the Lok Sabha unless he is a citizen of India and has competed the age of
    a) 21 years.
    b) 22 years.
    c) 24 years.
    d) 25 years.

29. The ministers of the union cabinet are answerable to
    a) The Prime Minister.
    b) The Lok Sabha.
    c) The President.
    d) The Vice-President.

30 The executive power of the state is vested in
    a) The Governor.
    b) The state Legislature.
    c) The Chief Minister.
    d) None of the above.

31. The speaker of the Lok Sabha
    a) Is appointed by the President.
    b) Is elected by the members of the Parliament.
    c) Is elected by the members of the Lok Sabha.
    d) None of the above.

32. Which of the following is the guardian of the fundamental rights of the citizens?
    a) The Supreme Court.
    b) The President.
    c) The Parliament.
    d) The Lok Sabha.

33. The President of India has power to issue ordinances when
    a) There is a national emergency.
    b) The Lok Sabha has been dissolved.
    c) The Government wants immediate legislation.
    d) The Parliament is not in session.

34. The Indian judiciary is a
    a) Highest law-making body.
    b) Single and integrated judicial system.
    c) Dependent judicial system.
    d) None of the above.

35. Which of the following falls under the original jurisdiction of the Supreme Court?
    a) Disputes relating to the civil matters.
    b) Disputes relating to the criminal matters.
    c) Disputes between two citizens belonging to two different states.
    d) Disputes between the two states of the Indian union.

36 The Supreme Court of India can review
    a) Its own orders or judgments.
    b) The orders issued by the executive.
    c) The laws passed by the legislature.
    d) Both (a) and (b).

37. All the union ministers sail and swim together. The entire ministry has to resign if it loses the confidence of the
    a) President of India.
    b) Lok Sabha.
    c) Rajya Sabha.
    d) None of the above.

38. The ministers hold office during the pleasure of the President which infact means during the pleasure of
    a) The Parliament.
    b) The Lok Sabha.
    c) The Prime Minister.
    d) None of the above.

39. The Governor in the state plays a dual roll as an agent of the President and
    a) As the agent of Chief Minister in the state.
    b) As the agent of Chief Justice of India.
    c) As the constitutional head of the state.
    d) As the agent of the Prime Minster.

40. Which of the following contains largest number of subjects?
    a) State list.
    b) Concurrent list.
    c) Union list.
    d) None of the above.

41. "The ideal fuel for modern living" is an example of
    a) Trade secret.
    b) Patent.
    c) Copy right.
    d) Trade mark.

42. According to the Marriage Act of 1954, the age is fixed at 21 years for the men and ..... for women
    a) 15 years.
    b) 18 years.
    c) 21 years.
    d) 25 years.

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    a) 15 years.
    b) 18 years.
    c) 21 years.
    d) 25 years.

43. The state legislative assembly is prorogued by
    a) The Chief Minister.
    b) The Governor.
    c) The Speaker of the assembly.
    d) None of the above.

44. The public is put to increased risk by allowing increased number of deviations from specified standards of safety and acceptable risk is known as
    a) Normal accident.
    b) Normalizing deviance.
    c) Risk assessment.
    d) Overestimated risk.

45. The Chief Justice and other Judges of the other state High Courts hold office until they attain the age of
    a) 58 years.
    b) 60 years.
    c) 62 years.
    d) 65 years.

46. An integral part of the Parliament is
    a) The President of India.
    b) The Chief Justice of India.
    c) The Prime Minister of India.
    d) The Election Commissioner.

47. $\frac{1}{3}^{rd}$ of the members of the Rajya Sabha retire
    a) Every year.
    b) Every two years.
    c) Every three years.
    d) None of the above.

48. Chief Justice and other Judges of the Supreme Court hold office until they attain the age of
    a) 50 years.
    b) 55 years.
    c) 60 years.
    d) 65 years.

49. The Election Commissioners are appointed by
    a) The President.
    b) The Prime Minister.
    c) The Chief Justice of India.
    d) The Vice President.

50. A compound measure of the probability and magnitude of adverse effect is known as
    a) Compensation.
    b) Benefit.
    c) Risk.
    d) Accident.

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Test Booklet Version : A

I/II Semester B.E Degree Examination, December.06 / January.07

ENVIRONMENTAL STUDIES

(COMMON TO ALL BRANCHES)

Time: 3 hrs.] [Max. Marks:100

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7. **All questions are compulsory and carry equal marks.**

1. Which Pyramid is always upright?
   a) Energy.
   b) Biomass.
   c) Numbers.
   d) Food chain.

2. Which of the following is a producer in an ecosystem?
   a) Plants and some bacteria capable of producing their own food.
   b) Animals.
   c) Human beings.
   d) Fish.

3. In an ecosystem biological cycling of materials is maintained by
   a) Producer.
   b) Consumer.
   c) Decomposer.
   d) All of the above.

4. World Environment day is on
   a) 5th May.
   b) 5th June.
   c) 18th July.
   d) 16th August.

5. Which of the following conditions must be fulfilled to ensure food security?
   a) Food must be available.
   b) Each person must have access to it.
   c) Food utilized/consumed must fulfill nutritional requirements.
   d) All of the above.

6. Sustainable development means
   a) Meeting present needs without compromising on the future needs.
   b) Progress in human well beings.
   c) Balance between human needs and the ability of Earth to provide resources.
   d) All of the above.

7. E.I.A. is related to
   a) Resource conservation.
   b) Efficient equipment/process.
   c) Waste minimization.
   d) All of the above.

8. Which of the following is a key element of EIA?
   a) Scoping.
   b) Screening.
   c) Identifying and evaluating alternatives.
   d) All of the above.

9. Eutrophication is
   a) An improved quality of water in lakes.
   b) A process in carbon cycle.
   c) The result to accumulation of plant nutrients in water bodies.
   d) A water purification technique.

10. The adverse effect of modern agriculture is
    a) Water pollution.
    b) Soil degradation.
    c) Water logging.
    d) All of the above.

11. Which of the following statement is false?
    a) Soil erosion affects the productivity of agriculture fields.
    b) It takes 300 years for one inch of agriculture top soil to form.
    c) The amount of erosion depends on soil type, slope, drainage pattern and crop management practices.
    d) Soil erosion helps to retain water and nutrients in the root zone.

12. What would you do to prevent environmental damage?
    a) Plant trees.
    b) Halt deforestation.
    c) Control pollution.
    d) All of the above.

13. Major causes of deforestation are
    a) Shifting cultivation.
    b) Fuel requirements.
    c) Raw materials for industries.
    d) All of these.

14. Which of the following statements about forest is not correct?
    a) Forest reduces soil erosion.
    b) Provides recreational opportunities.
    c) Provides a source of economic development.
    d) None of the above.

15. What is maximum allowable concentration of fluorides in drinking water?
    a) 1.0 mg/1.
    b) 1.25 mg/1.
    c) 1.50 mg/1.
    d) 1.75 mg/1.

16. _____ are referred to as Earth's lungs.
    a) Forests.
    b) Carbon cycles.
    c) Water sources.
    d) Mines.

17. Among the fresh water available in the Earth the percentage of surface water is about
    a) 50%.
    b) 10%.
    c) 5%.
    d) Less than 1%.

18. Mineral resources are
    a) Renewable.
    b) Available in plenty.
    c) Non renewable.
    d) Equally distributed.

19. Which of the following is not a part of the hydrological cycle?
    a) Precipitation.
    b) Infiltration.
    c) Transpiration.
    d) Perspiration.

20. The ground water depends on
    a) Amount of rain fall.
    b) Geological formations.
    c) Run off.
    d) All of the above.

21. Which of the following is considered as an alternate fuel?
    a) CNG.
    b) Kerosene.
    c) Coal.
    d) Petrol.

22. Which of the following is not a renewable source of energy?
    a) Fossil fuels.
    b) Solar energy.
    c) Tidal wave energy.
    d) Wind energy.

23. Electromagnetic radiations can cause.
    a) Plague.
    b) Malaria.
    c) Cancer.
    d) Dengue Fever.

24. Wind energy generation depends on
    a) Direction of wind.
    b) Velocity of wind.
    c) Humidity.
    d) Precipitation.

25. In Hydropower plants power is generated by
    a) Hot springs.
    b) Wind.
    c) Sun.
    d) Water.

26. Nuclear fusion uses the following as a fuel
    a) Carbon.
    b) Helium.
    c) Hydrogen.
    d) Water.

27. Nuclear power plant in Karnataka is located at
    a) Bhadravathi.
    b) Sandur.
    c) Raichur.
    d) Kaiga.

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    c) Raichur.
    d) Kaiga.

28. Biogas is gaseous fuel composed mainly of
    a) Methane and Carbon dioxide.
    b) Methane and hydrogen sulphide.
    c) Methane and carbon monoxide.
    d) None of the above.

29. Environmental pollution is due to
    a) Rapid Urbanization.
    b) Deforestation.
    c) Aforestation.
    d) a and b, as above

30 Which of the following are natural sources of air pollution.
    a) Volcanic eruption.
    b) Solar flair.
    c) Earth quake.
    d) All of the above.

31. Physical pollution of water is due to
    a) Dissolved oxygen.
    b) Turbidity
    c) pH
    d) None of the above.

32. Air pollution from automobiles can be controlled by fitting
    a) Electrostatic precipitator.
    b) Wet scrubber.
    c) Catalytic converter.
    d) All of the above.

33. Definition of Noise is
    a) Loud sound.
    b) Unwanted sound
    c) Constant sound.
    d) Sound of high frequency.

34. Pesticide causes
    a) Eye irritation.
    b) Skin irritation.
    c) Respiratory ailments.
    d) All of the above

35. Alternative eco-friendly fuel for automobiles is
    a) Petrol.
    b) Diesel.
    c) CNG.
    d) Kerosene.

36 Which of the following is the ill effect of urbanization
    a) Decrease in agriculture land.
    b) Loss of greenery.
    c) Loss of water bodies.
    d) All of the above.

37. The world population in 2000 was around
    a) 8 billion.
    b) 6.1 billion.
    c) 4 billion.
    d) 4.5 billion.

38. The major objectives of family welfare programs in India is
    a) Disease control.
    b) Population growth rate control.
    c) Employment generation.
    d) None of the above.

39. Demography is the study of
    a) Animal's behavior.
    b) Population growth.
    c) River.
    d) None of the above.

40. Which green house gas is known as colorless, non-flammable, sweetish odor and laughing gas?
    a) Methane.
    b) CO_2.
    c) Nitrous Oxide.
    d) Sulfur hexa fluoride.

41. Population explosion will cause
    a) Socio economical problems.
    b) Food scarcity.
    c) Energy crisis.
    d) All of the above.

42. Global Warming could affect
    a) Climate.
    b) Increase in Sea level.
    c) Melting of glaciers.
    d) All of the above.

43. Each Chlorine free Radical can destroy the following number of ozone molecules.
    a) 1000.
    b) 10,000.
    c) 1,00,000.
    d) 100.

44. Acid rain has been increasing day by day due to
    a) Urbanization.
    b) Industrialization.
    c) Increase in vehicle population.
    d) None of the above.