

2E2001

Roll No. _____

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2E2001

B. Tech. I Year II Semester (Main/Back) Examination-2014
201 Communication Techniques

Time : 3 Hours**Maximum Marks : 80****Min. Passing Marks (Main) : 26****Min. Passing Marks (Back) : 24****Instructions to Candidates:**

*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) What do you understand by "Communication"? Why is 'Communication' important? (8)
- b) Explain the objectives of communication. (8)

OR

1. a) Explain the process of communication, giving examples. (8)
- b) Why is downward communication regarded so important? What are its limitations? (8)

Unit - II

2. a) What do you mean by the word 'Verbal'? Why is Verbal communication regarded so important? (8)
- b) Explain the qualities of good communication. (8)

OR

2. a) What are the advantages and limitations of written communication? (8)
- b) Make distinction between formal and informal channels of communication. (8)

Unit - III

3. a) What are the communication barriers? (8)
- b) What do you understand by professional communication? (8)

OR

3. a) How to Overcome communication barriers? (8)
 b) How is professional communication useful for organizations? (8)

Unit - IV

4. a) In the following sentences, select the verb form which you feel is appropriate. If both the verb forms given are appropriate, give reasons :
- The team (has, have) won fifteen games this season.
 - What you believe about these matters (doesn't, don't) make a difference.
 - Mr. Garg, together with his five guests, (has, have) gone out to dinner.
 - There (was, were) a number of players waiting near the gate. (8)
- b) Fill in the appropriate conjunctions. Choose from the conjunctions in brackets:
- She would have purchased those gold bangles ——— she had enough money. (Until, So, if)
 - Animals don't kill ——— they are hungry. (although, unless, because)
 - He works hard ——— he may get good marks. (Lest, because, in order that)
 - No sooner did the lion saw the deer ——— it pounced on it. (When, although, than) (8)

OR

4. a) Combine the sentences using relative pronoun : (8)
- The house is empty now.
We used to live there
 - The speech was very informative.
Prof. Tandon delivered it.
 - The plane was not in a good condition.
It crashed
 - Some cash has been recovered.
It was stolen from a bank.

b) Correct the following sentences :

(8)

- i) She is elder than my sister.
- ii) Though he is rich but he is unhappy
- iii) What is the time in your watch?
- iv) He is a M.A. in Economics.

Unit - V

5. a) You are a B. Tech. A faculty position in your branch is vacant in a college. Apply for this position with resume. Invent necessary details. (8)
- b) On behalf of the librarian of your college, write a letter of inquiry to a prominent book seller asking for the latest catalogue and details of discount offered to libraries. (8)

OR

5. a) Which basic e - mail etiquette rules and techniques should be kept in mind while writing e - mail messages? (8)
- b) What things should be kept in mind while making and receiving phone calls?(8)
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2E2002

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2E2002

B.Tech. I Year II Semester (Main/Back) Examination-2014
202 Engg. Mathematics-II

Time : 3 Hours

Maximum Marks (Back) : 80

Min. Passing Marks (Main) : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Find the equation of the sphere having the circle $x^2 + y^2 + z^2 = 9$, $x - 2y + 2z = 5$ as a great - circle (8)
- b) Find the equation to the right circular cone with vertex at the origin, axis the line $\frac{x}{2} = \frac{y}{-4} = \frac{z}{3}$ and which passes through the point (1,1,2) (8)

OR

1. a) Obtain the equation of the sphere which passes through the four points (4,-1,2), (0,-2,3), (1,5,-1), (2,0,1). (8)
- b) Find the equation of the right circular cylinder whose axis is $x=2y=-z$ and radius 4 (8)

Unit - II

2. a) Examine for consistency the following equation and solve them if they are consistent.

$$x + y + z = 6, 2x + y + 3z = 13,$$

$$5x + 2y + z = 12, 2x - 3y - 2z = -10$$

(8)

- b) Find the eigen values and eigen vectors of the following matrix

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix} \quad (8)$$

OR

2. a) Test for consistency the following system of equations and if possible, solve them :

$$5x + 3y + 7z = 4, 3x + 26y + 2z = 9, 7x + 2y + 10z = 5 \quad (8)$$

- b) Find the characteristic equation of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$. Show that the matrix A satisfies it. Hence find A^{-1} (8)

Unit - III

3. a) Find a unit vector normal to the surface $x^2 + y + 2xz = 4$ at the point (2,-2,3) (4)

- b) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ show that $\text{div}\left(\frac{\vec{r}}{r^3}\right) = 0$ (4)

- c) Find the total work done in moving a particle in a force field given by $\vec{F} = 3xy\hat{i} - 5z\hat{j} + 10x\hat{k}$ along the curve $x = t^2 + 1, y = 2t^2, z = t^3$ from $t=1$ to $t=2$ (8)

OR

3. a) Find the directional derivative of $f(x,y,z) = x^2yz + 4xz^2$ at (1,-2,-1) in the direction of $2\hat{i} - \hat{j} - 2\hat{k}$ (4)

- b) Prove that $\nabla^2\left(\frac{1}{r}\right) = 0$ (4)

- c) If $\vec{F} = 2z\hat{i} - x\hat{j} + y\hat{k}$ evaluate $\iiint_V \vec{F} \cdot d\vec{v}$ where V is the region bounded by the surfaces $x = 0, y = 0, x = 2, y = 4, z = x^2$ and $z = 2$ (8)

Unit - IV

4. a) Verify Gauss's divergence theorem for the function $\vec{F} = y\hat{i} + x\hat{j} + z^2\hat{k}$ over the cylindrical region bounded by $x^2 + y^2 = 9$, $z = 0$ and $z = 2$. (8)
- b) Verify Green's theorem for $\int_C (xy + y^2)dx + x^2 dy$ where C is bounded by $y = x$ and $y = x^2$ (8)

OR

4. a) Find the Fourier series to represent $f(x)$ given by

$$f(x) = \begin{cases} x & \text{for } 0 \leq x \leq \pi \\ 2\pi - x & \text{for } \pi \leq x \leq 2\pi \end{cases} \quad (8)$$

- b) Obtain the expansion for y from the following table upto the first harmonic :

x:	0	1	2	3	4	5
y:	9	18	24	28	26	20

(8)

Unit - V

5. a) Solve $(y^2 + z^2 - x^2)p - 2xyq = -2xz$ (4)
- b) Solve $9(p^2z + q^2) = 4$ (4)
- c) Solve in series :

$$x(1-x)\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} - y = 0 \quad (8)$$

OR

5. a) Solve :
 $x(y^2 + z)p - y(x^2 + z)q = (x^2 - y^2)z$ (4)
- b) Solve :
 $Z = px + qy + c\sqrt{1 + p^2 + q^2}$ (4)
- c) Find the complete integral of $2(z + xp + yq) = yp^2$ (8)

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B. Tech. I Year II Semester (Main/Back) Examination-2014**203 Engg. Physics - II****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks (Back) : 24****Min. Passing Marks (Main) : 26****Instructions to Candidates:**

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit - I

1. a) Give the formulation of time dependent Shrodinger's equation for a free particle. Discuss the interpretation of position, probability density and normalization of wave function. (4+2+2+2)
- b) A quantum particle confined to one dimensional box of width 'a' is known to be in its first excited state. Determine the probability of the particle in the central half. (6)

OR

1. a) Solve Shrodinger's wave equation for a particle in one - dimensional box. Discuss the various energy states. (4+4)
- b) X-rays of wavelength 0.2\AA are scattered from a target. Calculate the wavelength of X-ray scattered through 45° . Also find the maximum Kinetic energy of the recoil electron. (4+4)

Unit - II

2. a) Explain the following
 - i) Degeneracy,
 - ii) Order of degeneracy and
 - iii) Non - degeneracy state (2+2+2)
- b) A free particle is confined in a cubical box of side 'a' write the eigen values and eigen functions for an energy state represented by $n_x + n_y + n_z = 4$. (5+5)

4

OR

2. a) Define fermi energy. Derive an expression for fermi energy of a system of particles. (2+6)
- b) A beam of electron is incident on a potential barrier of height 5 eV and width 0.2nm. What should be the energy of electrons so that half of them are able to penetrate through the barrier? (8)

Unit - III

3. a) What is Coherence? Explain temporal and spatial Coherence. For the source to be spatial Coherent, find the condition for its size. (2+4+2)
- b) A step index optical fibre has a core radius of 30 μm ; $n_1 = 1.5$ and $n_2 = 1.47$. If the operating wavelength is 800 nm, find the no. of modes propagating through the fibre (8)

OR

3. a) A fibre having a core index of n_1 , cladding index n_2 used in a communication link. Prove that $NA = n_1 (2\Delta)^{1/2}$, where $\Delta = \frac{(n_1 - n_2)}{n_1}$ (8)
- b) Calculate temporal Coherence length for
- i) Mercury vapor lamp emitting in green portion of spectrum at Wavelength of 546.1 nm with emission band width of $\Delta\nu = 6 \times 10^8 \text{ Hz}$. (4)
- ii) A helium neon laser operating at wavelength of 632.8 nm. (4)

Unit - IV

4. a) What are the basic requirements of semi conductor laser? Draw its label diagram and explain its working with necessary theory. Write down the applications of semiconductor laser. (2+4+2)
- b) What is the fundamental principle of a hologram? How is it produced and how is image constructed from it? (4+4)

OR

4. a) Explain the term absorption, spontaneous emission and stimulated emission and derive a relation between Einestein's Coefficients. (2+2+2+4)
- b) What is holographic microscopy? With illustrative diagram show outlay of a holographic interferometer and explain its working. (2+2+2)

Unit - V

5. a) Draw a labelled diagram of proportional counter and explain its use in detection of α , β , soft x-rays and γ -rays. (2+6)
- b) A G.M. Counter has a plateau slop of 3% per 100 volts. If the operating point is at 1100 volts. What is the maximum permissible voltage fluctuation in the counting is not affected by more than 0.1%? (8)

OR

5. a) Explain the principle of particle detection. Draw $\log n - v$ graph showing different regions and discuss the significant physical processes taking place in these regions. (2+6)
- b) An α - particle loses all its energy in producing 15×10^4 electron-ion pairs in the ionization chamber. 35eV energy is required to produce an electron - ion pair. What is the Kinetic energy of the α -particle? Calculate the amount of charge collected by each plate. (4+4)
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2E2004

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2E2004

B. Tech. I Year II Semester (Main/Back) Examination-2014
204 Chemistry & Environmental Engineering

Time : 3 Hours

Maximum Marks : 80

Min Passing Marks (Main) : 26

Min. Passing Marks (Back) : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Explain temporary and permanent hardness of water. (5)
- b) Discuss various units used to express hardness and their relationship. (5)
- c) A standard hard water contains 15gm of CaCO_3 per litre, 20ml of this required 25ml of EDTA solution, 100ml of sample water required 18 ml of EDTA solution. The sample after boiling required 12ml of EDTA solution. Calculate the temporary, permanent and total hardness of sample water. (6)

OR

1. a) What are the characteristics of drinking water. Explain various steps involved in removing suspended impurities from the water. (6)
- b) Write short notes on any two of the following :
 - i) Role of Eriochrome Black-T indicator in EDTA titration
 - ii) Break point chlorination
 - iii) Clark's method of hardness determination. (5+5)

Unit - II

2. Explain Demineralization process of water softening with diagram. (16)

OR

2. Write short notes on any two of the following :

- i) Scale and sludge formation
- ii) Priming and foaming
- iii) Reactions involved in Lime-soda method. (8+8)

Unit - III

3. a) What is Ecosystem. Discuss various components and functions of ecosystem. (10)
- b) What are renewable and non - renewable resources energy. (6)

OR

3. a) What is biodiversity? What are the basic laws of biodiversity? Describe the population characteristics analysis in ecology. (10)
- b) Discuss the advantages and limitations of Environmental Impact Assessment (EIA) (6)

Unit - IV

4. a) What is air pollution? Explain harmful effects of air pollution and control of air pollution. (10)
- b) Explain disposal methods of solid waste. (6)

OR

4. Write short notes on any two of the following :

- i) Global warming and its consequences
- ii) On Site Sanitation
- iii) Economic recovery of solid waste
- iv) Ozone depletion its effect and control. (8+8)

Unit - V

5. a) Briefly explain the collection, conveyance, treatment and disposal of waste water. (8)
- b) What is water pollution? Explain its causes, effect and control. (8)

OR

5. a) Define corrosion. Explain its significance and different types protections. (10)
- b) Write short notes on any two of the following :
- i) Galvanic corrosion
 - ii) Stress corrosion
 - iii) Pitting corrosion (3+3)
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2E2005

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[Total No. of Pages : 4]

2E2005

B. Tech. I Year II Semester (Main/Back) Examination-2014
205 Engineering Mechanics

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks (Back) : 24

Min. Passing Marks (Main) : 26

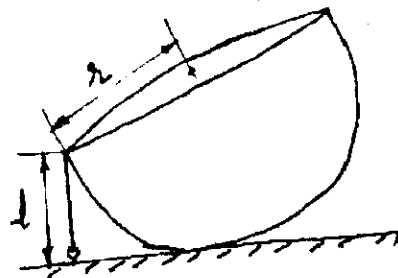
Instructions to Candidates:

Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Unit - I

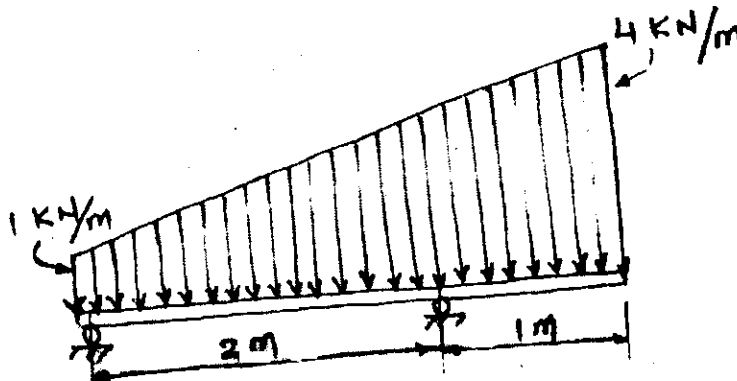
1. a) State and prove Lami's theorem. What are the limitations of Lami's theorem to find out resultant of forces? (4+2)
- b) A hemisphere of radius 'r' and weight 'W' is placed with its curved surface on smooth table and a string of length $l (< r)$ is attached to a point on its rim and to a point on table as shown in figure. Prove that tension in string

$$T = \frac{3W}{8} \times \frac{r-l}{\sqrt{2rl-l^2}} \quad (10)$$

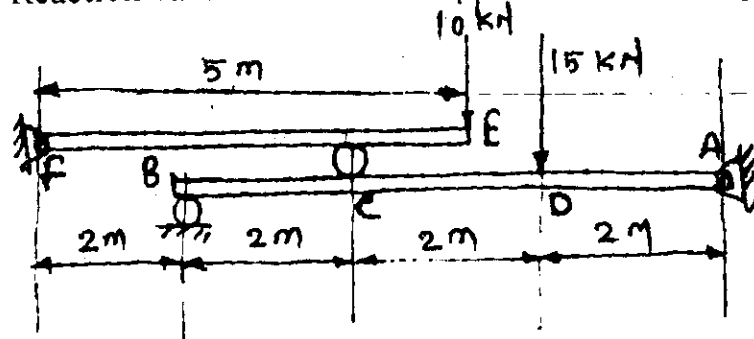


OR

1. a) Determine reaction at beam support for given loading conditions (8)

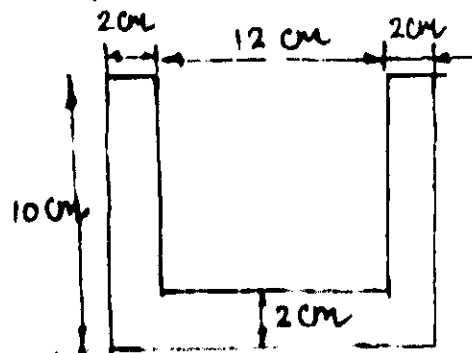


- b) Determine Reaction value at the roller support B and C using virtual work method.



Unit - II

2. a) State following theorems concerning moment of inertia for a plane area :
 i) Parallel axes theorem
 ii) Perpendicular axes theorem (2+2)
 b) Find area moment of inertia of section shown in figure, about x-axis and y-axis Passing through centroid of the section (12)

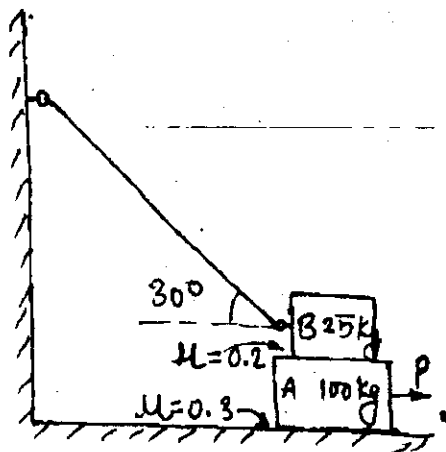


OR

2. a) How does the mechanical advantage and efficiency varies with load? (6)
 b) A Single purchase winch crab have following particulars:-
 Number of teeth on pinion - 16
 Number of teeth on spur wheel - 96
 length of lever arm - 70 cm
 Diameter of load drum - 20 cm
 It is Observed that an effort of 60N lifts a load of 1800 N and an effort of 120N lifts load of 3960 N.
 i) Find efficiency in two cases (5)
 ii) Determine loss of load and loss of effort in two cases (5)

Unit - III

3. a) A ladder of mass 35 Kg and length 10 m rest against a vertical wall and it is inclined at 60° to horizontal . The coefficient of friction for all surfaces is 0.25. How far up the ladder can a 72 kg person C climb before the ladder begins to slip. (8)
 b) Block A of mass 100 kg rests on horizontal surface and supports another Block B of mass 25 kg on top of it. Block B is attached to a vertical wall by on inclined string as shown in figure. Determine force P applied to lower block that will necessary to cause slipping to impend. (8)

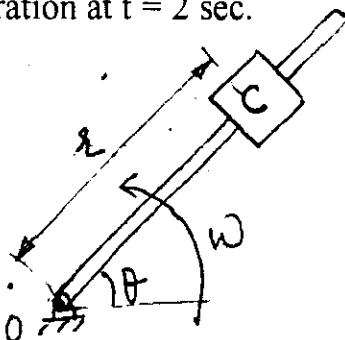


OR

3. a) Derive expression for length of belt of a Cross belt drive. (8)
- b) Two pulleys of diameter 0.6 m and 0.3 m connected by Cross belt drive are 3.5 m apart. Power transmitted is 5 KW. The permissible load on belt is 2.5 N/mm width of belt, larger pulleys make 220 rpm, thickness of belt is 5mm, and coefficient of friction b/w belt and pulley is 0.35. Determine
- Length of belt (2)
 - Width of belt (4)
 - Initial tension in belt (2)

Unit -IV

4. a) The motion of slider c is defined by the relation $r = 3t - t^2$ and $\theta = 2t$, where r is in meters and t is in seconds and θ in radians. Determine radial and transverse component of acceleration at $t = 2$ sec. (8)

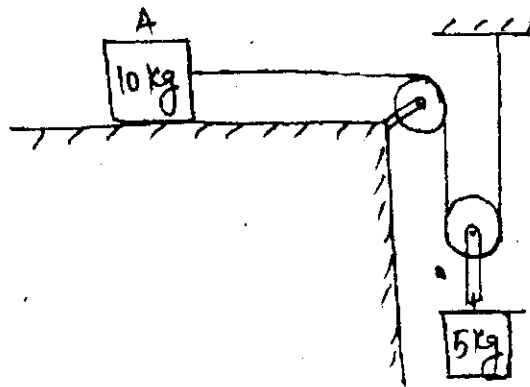


- b) Two vehicles are moving towards each other with velocities 20m/sec and 15m/sec. when distance between them is 150 m. Drivers of both vehicles apply their brake. In this condition they were able to just avoid accident Assuming constant retardation in each case, find out
- Retardation of each vehicle (3)
 - Time required to stop vehicles (3)
 - Distance travelled by each vehicle while slowing down. (2)

OR

4. a) A bird is sitting on a tree of 9.57m height. A hunter throws a stone towards bird but just before being hit by stone bird flies horizontally with 7.35 m/sec velocity. But stone hit the bird during downward motion after rising 4.9 m higher than that level. Determine projection velocity (8)

- b) A pulley, string and mass arrangement is shown in figure. When 10kg block is released it moves with an acceleration of (g/a) . Find out coefficient of friction between block and table surface. (8)

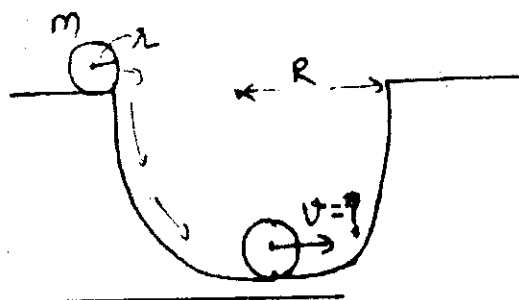


Unit-V

5. a) A wagon of 60 kN weight starts from rest and moves 30 m down on surface with 1% gradients. If selling resistance of track is 5N/kN, Determine velocity of wagon at 30 m distance. If wagon impact is absorbed by a spring which compress 1cm by 25 kN weight. Determine how much this spring will be compressed. (8)
- b) A ball of mass 3kg moving with velocity of 3m/s has an indirect collision with a ball of equal mass, moving with a velocity of 4.5 m/sec. The velocity of first ball and second ball makes an angle 30° and 60° with line of impact respectively. If coefficient of restitution is 0.9, find magnitude and directions of final velocities of two balls. (8)

OR

5. a) State impulse- momentum relation. A ball of 2kg is thrown straight up into air with initial velocity of 15 m/sec. Calculate time of flight using impulse momentum theorem. (4+4)
- b) A solid sphere of mass 'm' and radius 'r' is rolled down in a semi cylindrical cavity. Sphere rolls in cavity without slipping what is linear velocity of sphere at bottom of cavity? (8)



2E2006

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[Total No. of Pages : 3]

2E2006

B.Tech. I Year II Semester (Main/Back) Examination-2014
206 Fundamentals of Computer Programming

Time : 3 Hours

Maximum Marks (Back) : 80

Min. Passing Marks (Main) : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Explain Structure of program in C language briefly.& Define the concept of preprocessor (10)
- b) What is the difference between Constant and variable? What are the data types in C? Explain with examples (6)

OR

1. a) Write a program of add two numbers and explain this program step by step with the help of flow chart? (10)
- b) What is type casting? Explain its types (6)

Unit - II

2. a) Write a program to take marks of a student as input and calculate the grades according to following rules. (10)

Marks range	Grade
> 85	'S'
> 75 - < 84	'A'
> 65 - < 74	'B'
> 55 - < 64	'C'
> 50 - < 54	'D'
< 50	'F'

- b) Write a program to check whether the input number is prime or not (6)

OR

2. a) Write a program in C to print the sum of the following series

$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots \quad (10)$$

- b) Write a program to read a 3*3 matrix and print its values. (6)

Unit - III

3. a) Write a program to accept records of different states using array of structure. The structure should contain char state, int population, int literacy rate and int per capita income. Read in suitable data. Display the state whose literacy rate is highest and whose per capita income is highest. (10)

- b) What is structure in C? Give syntax of declaring a structure with an example (6)

OR

3. a) Explain the function fopen() used to open a file in C. What are the different modes associated with fopen()? Explain meaning of each one (10)

- b) How do you create array using dynamic memory allocation? Give example and also list benefits of this scheme? (6)

Unit - IV

4. a) Write a program to print reverse of a number using function. (10)

- b) Write a program to check whether a given character is vowel or not (6)

OR

4. a) What do you mean by function? How many types of functions are available in C? (10)

- b) Write C statement for passing a structure to a function defined in another source file. (6)

Unit - V

5. a) Draw the block diagram of basic architecture of a computer system (10)
b) Differentiate between random access method and sequential access method for memory devices (6)

OR

5. a) Write differences between the following
i) Interpreter and compiler
ii) High level assembly and machine language (10)
b) Calculate r's and (r-1)'s complement of the following
i) $(111010101)_2$
ii) $(2435)_{10}$
iii) $(FA2B)_{16}$
iv) $(731.241)_8$
v) $(24222)_5$
vi) $(101.001)_2$ (6)
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2E1003

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2E1003

B.Tech. I Year II Semester (Old/Back) Examination-2014

Common to all branches of Engg.

103 Physics

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit - I

1. a) Explain with the help of diagram and experimental arrangement to produce Newton's rings (2+4)
- b) Write short notes on
 - i) Antireflection coating and
 - ii) Interference filters (3+3)
- c) Michelson interferometer experiment is performed with a source which have two wavelengths 4882 \AA and 4886 \AA . By what distance does the mirror have to be moved between positions of disappearance of fringes (4)

OR

1. a) Show that plane polarized and circularly polarized light are the special cases of elliptically polarized light (8)
- b) Define specific rotation for solution. Describe the construction and working of Biquartz plate (8)

Unit - II

2. a) Derive an expression for the intensity of diffracted light in Fraunhofer's diffraction due to single slit. Discuss the conditions for maxima and minima in diffraction pattern. (10)

- b) What must be the minimum number of lines per cm in half inch width grating to resolve the $D_1(5896 \text{ \AA})$ and $D_2(5890 \text{ \AA})$ line of sodium in first order. (6)

OR

2. a) What is Holography? Describe the difference between Holography and photography (2+6)
b) Explain with diagram construction and reconstruction of Hologram. (8)

Unit - III

3. a) Explain the following
i) Spatial coherence (3)
ii) Temporal coherence (3)
iii) Coherence time (3)
iv) Coherence length (3)
b) Calculate the refractive indices of core and cladding of an optical fiber if its numerical aperture is 0.22 and relative index difference is 0.012 (4)

OR

3. a) Explain with diagram, construction and working of He-Ne laser (2+8)
b) Explain spontaneous and stimulated emission (3+3)

Unit - IV

4. a) Derive time dependent Schrodinger equation. Explain difference between time dependent & time-Independent schrodinger equations (8+2)
b) What is uncertainty principle? What is normalization condition of wave function (3+3)

OR

4. a) Derive the expression of wave function of particle for three dimensional potential cubic box. (12)
b) Calculate the probability of transmission of α -particle through the rectangular barrier indicated below $V_0 = 2\text{eV}$, $E = 1\text{eV}$ and barrier width = 1 \AA . (4)

Unit - V

5. a) Write down the postulates of special theory of relativity (3)
b) Define an inertial frame of reference and derive the Lorentz transformations (10)
c) Write the formula for relativistic energy. Explain it. (3)

OR

5. a) Give a neat diagram of Geiger-Muller counter and discuss its working. (8)
b) Write short notes on (2+2+2+2)
i) Quenching
ii) Photomultiplier tube
iii) Proportional counter
iv) Self Quenching

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2E1022

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B.Tech. I Year II Semester (Old/Back) Examination-2014**Common to all branches of Engg.****202 Engineering Mathematics - II****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****Instructions to Candidates:**

Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit - I

1. a) A plane passes through a fixed point (a,b,c) and cut the axes in A,B,C. Show that the locus of the centre of the sphere OABC is $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 2$ (8)
- b) Two spheres of radii r_1 and r_2 cut orthogonally. Prove that the radius of common circle is $\frac{r_1 r_2}{\sqrt{r_1^2 + r_2^2}}$ (8)

OR

1. a) Find the equation to the right circular cone with vertex at the origin, axis the line $\frac{x}{2} = \frac{y}{-4} = \frac{z}{3}$ and which passes through the point (1,1,2) (8)
- b) Define the right circular cylinder. Find the equation of right circular cylinder whose guiding curve is $x^2 + y^2 + z^2 = 9$, $x - y + z = 3$ (2+6=8)

Unit - II

2. a) Find the rank of the following matrix by reducing it to the normal form

$$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix} \quad (8)$$

- b) Investigate for consistency of following set of equations and find the solution

$$\begin{array}{l} 4x-2y+6z=8 \\ \text{if possible } x+y-3z=-1 \\ 15x-3y+9z=21 \end{array} \quad (8)$$

OR

2. a) Find the eigen values and the corresponding eigen vectors of the following

$$\text{matrix } \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix} \quad (8)$$

- b) Find a matrix P which reduces $A = \begin{bmatrix} -1 & 1 & 2 \\ 0 & -2 & 1 \\ 0 & 0 & -3 \end{bmatrix}$ to the diagonal form by the transformation PAP^{-1} . (8)

Unit - III

3. a) A particle moves along the curve $x=t^3+1, y=t^2, z=2t+5$, where t denotes time. Find the components of its velocity and acceleration at $t=1$ in the direction of the vector $\vec{\alpha} = \hat{i} + \hat{j} + 3\hat{k}$ (8)
- b) Find the directional derivative of $f = x^2 - y^2 + 2z^2$ at the point $p(1,2,3)$ in the direction of the line PQ where the coordinates of Q are $(5,0,4)$. Also find the magnitude of greatest directional derivative of f at the point $(1,2,3)$ (8)

OR

3. a) If \vec{a} and \vec{b} are differentiable vector point functions and u and v are differentiable scalar point functions. Then prove that
- $\text{div}(u\vec{a}) = u(\text{div}\vec{a}) + \vec{a} \cdot \text{grad } u$
 - $\text{curl}(v\vec{b}) = (\text{grad } v) \times \vec{b} + v \text{curl } \vec{b}$ (4+4=8)
- b) i) If $\vec{r} \times d\vec{r} = 0$; prove that $\hat{r} = \text{constant}$
- ii) Using stock's theorem, evaluate: $\int_C (xydx + xy^2dy)$ where C is the square in the xy - plane with vertices respectively $(1,0), (-1,0), (0,1)$ and $(0,-1)$. (4+4=8)

Unit - IV

4. a) A particle is acted on by a force parallel to the axis of y whose acceleration is λy and is initially projected with a velocity $a\sqrt{\lambda}$ parallel to the axis of x at the point where $y=a$. Prove that it will describe a catenary. (8)
- b) A particle moves in a catenary $s = c \tan \Psi$. The direction of acceleration makes equal angles with the tangent and normal to the curve at any point. If the speed at the vertex ($\Psi = 0$) be u , show that the velocity and acceleration at any point Ψ are ue^{Ψ} and $\frac{\sqrt{2}}{c}u^2e^{2\Psi}\cos^2\Psi$ (8)

OR

4. a) A particle is projected in a medium whose resistance is proportional to the cube of the velocity and no other force acts on the particle. While the velocity diminishes from v_1 to v_2 and the particle traverses a distance d in time t , show that $\frac{d}{t} = \frac{2v_1v_2}{v_1 + v_2}$ (8)
- b) A particle is projected vertically upwards with a velocity u in a medium whose resistance varies as the square of the velocity. If v is the terminal velocity then prove that particle will return to the point of projection with velocity $v_1 = \frac{uv}{\sqrt{u^2 + v^2}}$ (8)

Unit - V

5. a) Solve in series the equation $2x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + (1 - x^2)y = 0$ (8)
- b) Form the partial differential equation by eliminating the arbitrary functions $lx + my + nz = \phi(x^2 + y^2 + z^2)$ (8)

OR

5. a) Solve the following partial differential equation $z^2(p + q) = x^2 + y^2$ (8)
- b) Solve the following partial differential equation by charpit's method $(p^2 + q^2)y = qz$ (8)

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B.Tech. II Semester (Back) Examination-2014
Common for All Branch
204 Environmental Engg & Disaster Management

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Explain the various Environmental Acts & Regulations enacted by Government of India. (8)
- b) Comment upon energy flow in an ecosystem (4)
- c) Discuss Malthusian Theory of Population Growth. Also mention the reasons and consequences of population growth. (4)

OR

1. a) What do you understand by Biogeochemical cycle? Draw a neat and labelled sketch of Nitrogen cycle & discuss the flow of nitrogen in an ecosystem. (8)
- b) Differentiate between food chain and food web (4)
- c) What do you mean by Non-conventional Energy sources? Explain in brief the use of solar energy as renewable source of energy. (4)

Unit - II

2. a) Discuss the physical, chemical and biological quality parameters of potable water with their acceptable limits. (10)
- b) What is a septic tank? How it functions. (6)

OR

2. a) Why waste water management is important? How waste water management is carried out? (10)
- b) Explain sources of water along with their characteristics (6)

Unit - III

3. a) What do you understand by Noise pollution? Discuss the sources, adverse effects and control methods of noise pollution (10)
- b) What is "Acid Rain"? Explain how it is formed along with adverse effects and control methods (6)

OR

3. a) What do you mean by the term "solid waste" Describe the various steps involved in solid waste management in detail (10)
- b) Write short note (any two) (3×2=6)
- i) Characteristics of hazardous wastes (3)
 - ii) Transport-the main culprit of air pollution (3)
 - iii) Sanitary landfilling (3)
 - iv) Green house effect and global warming (3)

Unit - IV

4. a) Differentiate between natural hazard and disaster. Explain the various components of Disaster management cycle. (10)
- b) Briefly discuss the vulnerability of Indian sub-continent to drought. (6)

OR

4. a) Discuss the activities to be carried out during an earthquake and also post earthquake. (10)
- b) Write short notes on (3×2=6)
- i) Tsunami and its effects (3)
 - ii) Fire prevention methods (3)

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Unit - V

5. a) What do you understand by seismology? Explain plate tectonic theory and types of plate boundaries in detail (10)
- b) Explain the terms "focus" and "Epicentre". Also discuss the various scales used to measure intensity of an earthquake. (6)

OR

5. a) Explain the concept of seismic zoning. How India is divided according to Seismic zoning map of india. (10)
- b) Discuss various base isolation techniques used in the construction of earthquake resistant buildings. (6)
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B.Tech. I Year II Semester (Back) Examination-2014**Common to all branches of Engg.****206 Engineering Chemistry - II****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****Instructions to Candidates:**

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit - I

1. a) Define cracking? What are the advantages of catalytic cracking. Describe with neat and labelled diagram of fixed bed catalytic cracking (12)
- b) Write on "Characteristics of a good fuel". (4)

OR

1. a) Explain the manufacturing of synthetic petrol by Bergius process. (8)
- b) Write short notes on any two
 - i) Octane number
 - ii) Oil Gas
 - iii) Carbonization of coal (2×4)

Unit - II

2. a) Define calorific value of fuel? Explain the determination of CV of gaseous fuel by Junker's calorimeter. (8)
- b) Calculate the gross and net calorific value of a coal sample, having the following composition- C=85%, S=1%, H=5%, O =8% & rest is ash. (8)

OR

2. a) Write short notes on
- Flue gas analysis by Orsat's apparatus
 - Significance of ultimate analysis (4+4)
- b) A sample of coal was found to contain the following % composition C=80%, H=5%, O=2%, N=3% & rest is ash. Calculate the minimum weight of oxygen and air required for complete combustion of 1kg of coal. (8)

Unit - III

3. a) What is phase rule? Discuss the term phase, component and degree of freedom with exan.ple. (8)
- b) Explain sulphur system in detail. (8)

OR

3. a) What is reduced phase rule? Explain phase diagram of Bi-Cd system (8)
- b) Write short note on any two
- Application of Ag - Pb system
 - Triple point
 - Eutectic point (2×4)

Unit - IV

4. a) Define optical fibres? Describe the construction, working and applications of optical fibers. (10)
- b) Write notes on applications of conducting organic polymers (6)

OR

4. a) What are super conductors? Discuss their properties and uses (10)
- b) Write notes on fullerenes (6)

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Unit - V

5. a) What is corrosion? Explain electro chemical corrosion/wet corrosion mechanism in detail (10)
- b) Discuss concentration cell corrosion (6)

OR

5. a) Write any four factors to influencing corrosion and any four methods to control the corrosion (10)
- b) Distinguish between Galvanizing and Tinning. (6)
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