

(Revised course)

(3 Hours)

[Total Marks : 80

- N.B. :** (1) Question No. 1 is compulsory.  
 (2) Answer any **three** questions from question nos. 2 to 6.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) Programming Calculators are **not allowed**.

1. (a) Evaluate  $\int_0^{\infty} x^2 7^{-4x^2} dx$  3  
 (b) Solve  $(D^4+4)y = 0$  3  
 (c) Prove that  $E \nabla = \Delta = \nabla E$  3  
 (d) Solve  $(x + 2y^3) \frac{dy}{dx} = y$ . 3  
 (e) Evaluate  $\iint_R r^3 dr d\theta$  over the region between the circles  $r = 2 \sin \theta$ ,  $r = 4 \sin \theta$ . 4  
 (f) Evaluate  $\int_0^1 \int_y^{\sqrt{y}} \frac{x}{(1-y)\sqrt{y-x^2}} dy dx$  4
2. (a) Solve :-  $(x^3y^4 + x^2y^3 + xy^2 + y) dx + (x^4y^3 - x^3y^2 - x^2y + x) dy = 0$  6  
 (b) Change the order of integral and hence evaluate  $\int_0^5 \int_{2-x}^{2+x} dx dy$  6  
 (c) Prove that  $\int_0^1 \frac{x^2}{\sqrt{1-x^4}} dx \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{\pi}{4\sqrt{2}}$  8
3. (a) Evaluate  $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x dx dy dz$ . 6  
 (b) Find the area of one loop of the lemniscate  $r^2 = a^2 \cdot \cos 2\theta$  6  
 (c) Solve  $(D^3+2D^2+D)y = x^2 e^{3x} + \sin^2 x + 2^x$ . 8
4. (a) Show that the length of arc of the parabola  $y^2 = 4ax$  cut off by the line  $3y = 8x$  is  $a \left( \log 2 + \frac{15}{16} \right)$  6  
 (b) Using the method of variation of parameters solve  $\frac{d^2y}{dx^2} + 4y = \tan 2x$ . 6  
 (c) Compute  $y(0.2)$  given  $\frac{dy}{dx} + y + xy^2 = 0$ ,  $y(0) = 1$  by taking  $h = 0.1$  using Runge-Kutta method of fourth order correct to 4 decimals. 8

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5. (a) Solve  $\frac{dy}{dx} + x(x+y) = x^3(x+y)^3 - 1$ . 6
- (b) Solve  $\frac{dy}{dx} - 2y = 3e^x$ ,  $y(0) = 0$  using Taylor series method. Find approximate value of  $y$  for  $x = 1$  and  $1.1$ . 6
- (c) Evaluate  $\int_0^6 \frac{dx}{1+x}$  using 8
- (i) Trapezoidal rule
- (ii) Simpson's  $\left(\frac{1}{3}\right)^{\text{rd}}$  rule and
- (iii) Simpson's  $\left(\frac{3}{8}\right)^{\text{th}}$  rule.
- Compare result with exact values.
6. (a) The current in a circuit containing an inductance  $L$ , resistance  $R$  and voltage  $E \sin \omega t$  is given by 6
- $$L \frac{di}{dt} + Ri = E \sin \omega t$$
- If  $i = 0$  at  $t = 0$ , find  $i$ .
- (b) Evaluate  $\iint_R e^{2x-3y} dx dy$  over the triangle bounded by  $x + y = 1$ ,  $x = 1$ ,  $y = 1$ . 6
- (c) (i) Find the volume of solid bounded by the surfaces  $y^2 = 4ax$ ,  $x^2 = 4ay$  and the planes  $Z = 0$ ,  $Z = 3$ . 4
- (ii) Change to polar co-ordinates and evaluate 4
- $$\int_0^a \int_{\sqrt{ax-x^2}}^{\sqrt{a^2-x^2}} \frac{dx dy}{\sqrt{a^2-x^2-y^2}}$$
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Con. 5848-13.

GX-10130

(REVISED)

(2 Hours)

[ Total Marks : 60

- N.B. :** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **three** questions from Q.no. 2 to Q.no. 6.  
 (3) Assume **suitable** data and **symbol** if required.  
 (4) **Figures** to the right indicate full **marks**.

1. Attempt any **five** : -

- (a) Explain why an extensive thin film appears black in reflected light? 3  
 (b) How will you increase the resolving power of a diffraction grating? 3  
 (c) Calculate the numerical aperture of a fiber with core index  $n_1 = 1.01$  and cladding index  $n_2 = 1.55$   $n_2 = 1.55$   $n_1 = 1.61$  3  
 (d) What is the difference between spontaneous and stimulated emissions. 3  
 (e) An electron is bound by a potential which closely approaches an infinite square well of width  $2.5 \times 10^{-10} \text{m}$ . Calculate first lowest permissible energy for electron. 3  
 (f) Write any two applications of CRO. 3  
 (g) What is MAGLEV? 3

2. (a) What do you understand by anti reflection coating? Derive the conditions with proper diagram. 8

(b) What is N.A.? Consider a multimode step under fibre with  $n_1 = 1.53$  and  $n_2 = 1.50$  and  $\lambda = 1 \mu\text{m}$ . If the core radius =  $50 \mu\text{m}$  then calculate the realised frequency of the fibre (V) and the number of guided mode. normalized  
 $\lambda = 1 \mu\text{m}$   
 $\mu\text{meter}$

3. (a) What is the difference between holography and photography? Discuss the construction and reconstruction of image in holography with neat diagram 8

(b) Derive the conditions for maxima and minima due to interference of light reflected from thin film of uniform thickness. 7

4. (a) What is the highest order spectrum which can be seen with monochromatic light of wavelength  $6000 \text{ \AA}$  by means of a diffraction grating with 5000 lines / cm. 5

(b) Explain the Heisenberg's uncertainty principle. 5

(c) What are Type I and Type II superconductors? 5

5. (a) A plane grating just resolve two lines in the second order. Calculate the grating element if  $d \lambda = 6 \text{ \AA}$ ,  $\lambda = 6 \times 10^{-5} \text{cm}$  and the width of the ruled surface is 2cm. 5

(b) Derive Schrodinger's time dependent wave equation. 5

(c) Explain the working of SEM with a neat diagram. 5

6. (a) Find the energy of the neutron in units of electron volts where De-broglie wavelength is  $1 \text{ \AA}$  5

$$\text{mass of neutron} = 1.674 \times 10^{-27} \text{kg}$$

$$\text{planck's constant} = 6.620 \times 10^{-34} \text{ J.secs}$$

(b) Write a short note on electrostatic focussing. 5

(c) What are carbon tubes and what are their properties. 5



**Con. 5731-GX-10141-13.**

**2**

4. (a) What are alloy steels ? Explain special effects of the following metals on properties of alloy steels :- **6**
- (i) Chromium
  - (ii) Nickel
  - (iii) Cobalt
  - (iv) Tungsten.
- (b) What is the principle of cathodic protection method of corrosion control ? Discuss any *one* method of corrosion control by cathodic protection. **5**
- (c) Write a note on 'sandwich panel' type layered composites. **4**
5. (a) What is cracking ? With a schematic diagram, explain any *one* method of catalytic cracking. **6**
- (b) What is powder metallurgy ? How are metal powders prepared ? **5**
- (c) Discuss the influence of *any two* physical factors on adhesive action. **4**
6. (a) What is 'oxidation corrosion' ? Discuss the role of nature of oxide formed in oxidation corrosion. **5**
- (b) A sample of coal has the following composition by weight :- **5**  
C = 82%, H = 6%, O = 8%, S = 0.5%, N = 3% and Ash = 0.5%. Calculate the Gross and Net Calorific value using Dulong's formula.
- (c) What is an alloy ? Explain any four purposes of alloying with suitable examples. **5**

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# Structured Programming Approach.

FE (Sem-II)

07 Dec 2013.

P3-upq-Oct13-2ndHalfoc13 D-8

Con. 5529-13.

(REVISED COURSE)

GX-10151

(3 Hours)

[Total Marks : 80

**N.B. :** (1) Question No. 1 is **compulsory**.

(2) Attempt any **three** questions from remaining **five** questions.

(3) Figures to **right** indicate **full** marks.

(4) Assume **suitable** data if **necessary**, but justify the **same**.

1. (a) What do you mean by algorithm ? which points you should consider while developing the algorithm. 4
- (b) Find the roots of quadratic equation. Is the above problem definition is complete ? if not, make this problem definition complete. 4
- (c) State any 2 library functions in math.h along with its uses. 4
- (d) What do you mean by static and auto storage class. explain. 4
- (e) Difference between while and do.. while loop. 4
2. (a) Write a program in C to cyclically rotate the elements in array. Program should accept a choice in which direction to rotate i.e. left or right. Depending on choice it should perform cyclic rotation. 10  
Suppose array A contains elements {1, 2, 3, 4, 5} then if choice is rotate right o/p should be {5, 1, 2, 3, 4} and if choice is rotate left then o/p should be {2, 3, 4, 5, 1}
- (b) Write a program to generate prime nos between 1 to 100. 10
3. (a) What do you mean by recursion ? Write a program, which will accept 2 nos from user say x and y. and calculate  $x^y$ . Program should make use of recursion. 10  
If x is 3 and y is 4 then output should be  $3^4$  i.e. 81.
- (b) Write a program to sort given nos in descending order. 10
4. (a) What do you mean by struct ? What do you mean by nested structure ? A sport club of cricket needs to maintain data about players. Description of it is given below. Club want to maintain players name, age, no of matches played, no of runs, and average. For above description declare a structure and comment about size of structure of your declaration. 10
- (b) Write a program which will accept 2 dimensional square matrix and find out transpose of it. Program should not make use of another matrix. 10

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5. (a) Write a program to generate followig patterns.

10

(1) 5  
4 4  
3 3 3  
2 2 2 2  
1 1 1 1 1

(2) 1  
2 2  
3 3 3  
4 4 4 4  
5 5 5 5 5

(b) Write a program to check whether given string is palindrome or not.

10

6. (a) What are the different ways for parameter passing to a function. Explain along with example. 10

(b) What do you mean by FILE ? What are the different functions available to read data from the file ? Specify the different modes in which files can be opened along with syntax. 10

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Con. 6498-13.

(REVISED COURSE)

GX-10165

(2 Hours)

[Total Marks : 40]

**N.B. :** (1) Question no. 1 is **compulsory**.(2) Attempt any **three** questions out of the remaining **five** questions.(3) All questions carry **equal** marks.

1. Answer the following :-
  - (a) Write short notes on any **two** of the following :- 6
    - (i) Principles of business letter writing (any two)
    - (ii) Objectives of communication.
    - (iii) Role of silence in communication.
  - (b) Discuss some of the barriers to effective reading. 4
  
2. Answer the following questions :-
  - (a) Discuss the importance of feedback in the process of communication with the help of a labelled diagram. 4
  - (b) Give a diagrammatic representation of the semi-block form of letter. 3
  - (c) Define the following :- 3
    - (i) Computer, (ii) Electric Iron, (iii) Calculator
  
3. Answer the following questions :-
  - (a) What are the various channels of communication in a business organisation? 4  
Differentiate between upward and downward channels of communication.
  - (b) Assuming yourself to be the General Manager of a newly established company providing hardware and networking services, write an enquiry letter inviting quotations from reported companies to supply parts/peripherals in bulk for your routine requirement. Invent the necessary details. Use complete block form. 6
  
4.
  - (a) Discuss any two main barriers to communication. Why are they considered unhealthy in an organisation? 4
  - (b) You have purchased an expensive gadget of a reputed company from a retail store in Mumbai. After four months, the gadget stops working suddenly and shows an error message whenever you try to use it. Write a complaint letter to the store owner complaining about the same and ask for compensation. 6

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5. Do as directed :- 2
- (a) Use any two sets of words to form a single sentence:-
- (i) dessert - desert
- (ii) stationary - stationery
- (iii) principal - principle
- (b) What is jargon? How does it affect the understanding of the receiver? Explain with an example. 4
- (c) Give synonyms for any **two** :- 1
- (i) cherish, (ii) ideal, (iii) labyrinth
- (d) Give antonyms for any **two** :- 1
- (i) hero, (ii) frail, (iii) disappear
- (e) Correct the error in the following sentences :- 2
- (i) Teacher called Harry and I to the staffroom.
- (ii) It's 2 O'clock in my watch.
6. (a) Distinguish between caution and warning with an example of each. 2
- (b) What is grapevine type of communication? Explain with a relevant example. 3
- (c) Read the following passage and answer questions given below it : 5
- Communication is part of our everyday life. We greet one another, smile or frown, depending on our moods. Animals, too, communicate in the same way, much to our surprise. Just like us, interaction among animals can be both verbal or non-verbal.
- Singing is one way in which animals can interact with one another. Male blackbirds often use their melodious songs to catch the attention of the females. These songs are usually rich in notes variation, encoding various kinds of messages. Songs are also used to warn and keep off other blackbirds from their territory, usually a place where they dwell and reproduce.
- Large mammals in oceans sing, too, according to adventurous sailors. Enormous whales groan and grunt while smaller dolphins and porpoises produce pings, whistles and clicks. These sounds are surprisingly received by other mates as far as several hundred kilometers away.
- Besides singing, body language also forms a large part of animals' communication tactics. Dominant hyenas exhibit their power by raising the fur hackles on their necks and shoulders, while the submissive ones normally surrender to the powerful parties by crouching their heads low and curling their lips a little, revealing their teeth in friendly smiles.

Colours, which are most conspicuously found on animals, are also important means of interaction among animals. Male birds of paradise, which have the most gaudy coloured feathers often hang themselves upside down from branches, among fluffing plumes displaying proudly their feathers, attracting the opposite sex.

The alternating black and white striped coats of zebras have their roles to play too. Each zebra is born with a unique set of stripes which enables its mates to recognise them. When grazing safely, their stripes are all lined up neatly, so that none of them loses track of their friends. However, when danger such as a hungry lion approaches, the zebras would dart out in various directions, making it difficult for the lion to choose his target.

Insects, such as the wasps, armed with poisonous bites or stings, normally have brightly painted bodies to remind other predators of their power. Hoverflies and harmless insects also make use of this fact and colour their bodies brightly in an attempt to fool their predators into thinking that they are as dangerous and harmful as the wasps.

- (i) How is singing used by animals?
- (ii) How long can a whale's grunt be heard in the ocean?
- (iii) How do zebras react to the danger of an attacking lion?
- (iv) How do dominant hyenas exhibit their power?
- (v) Which animals / birds have been mentioned in the above passage having gaudy colours?





5. A hexagonal pyramid base 25 mm side, axis 55 mm long has its base on HP, with an edge of base parallel to VP. A section plane perpendicular to VP and inclined at 60 degrees to HP bisects the axis of the pyramid. Draw FV, sectional TV, true shape of the section and Development of Lateral Surface of pyramid removing apex.

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6. (a) Line AB 70 mm long is inclined  $30^\circ$  to HP and  $60^\circ$  to VP. Its end A is 10 mm above HP and 20 mm in front of VP, while its end B is in 3<sup>rd</sup> Quadrant. Draw projections of line AB.

9

(b) Draw the isometric view using given F. V. and LHSV.

6

