

23-11-2014

(REVISED COURSE)**QP Code : 11873**

(2 Hours)

[Total Marks : 60

- N.B. : (1) Question No.1 is **Compulsory**.
 (2) Attempt any **three** Questions from remaining **five** questions.
 (3) **All** questions carry **equal** marks.
 (4) **Figures** to the **right** indicate **full** marks.
 (4) **Atomic Weights** : H = 1, C = 12, N = 14, O = 16, S = 32, Cl = 35.5, Ea = 137.3.

1. Answer any **five** of the following :-

- (a) Distinguish between Galvanizing and tinning. 15
 (b) Give composition, properties and uses of Duralumin.
 (c) What is 'cracking' of heavy oil? Mention any four advantages of catalytic cracking over thermal cracking.
 (d) Explain 'Design for Energy Efficiency' principle in Green Chemistry.
 (e) What are composite materials? Mention any four characteristic properties of composite materials.
 (f) Gold and platinum do not get corroded in atmospheric oxygen. Explain.
 (g) A sample of coal has the following composition by mass : C = 75%, H = 7%, O = 8%, S = 4%, N = 2% and Ash = 4%. Calculate Gross Calorific value of the fuel using Dulong's formula.
2. (a) What is Electrochemical corrosion? With a suitable diagram and electrode reactions, explain electrochemical mechanism of rusting of iron in neutral, aqueous medium. 6
 (b) What is meant by 'Knocking' in internal combustion engine? Define Octane number and Cetane number. Name any two anti-knock agents. 5
 (c) Calculate percentage atom economy for the following reaction with respect to allyl chloride. 4
- $$\text{CH}_3 - \text{CH} = \text{CH}_2 + \text{Cl}_2 \rightarrow \text{Cl} - \text{CH}_2 - \text{CH} = \text{CH}_2 + \text{HCl}$$
- allyl chloride
3. (a) A gaseous fuel has the following composition by volume :
 $\text{H}_2 = 40\%$, $\text{CH}_4 = 30\%$, $\text{CO} = 10\%$, $\text{C}_3\text{H}_8 = 12\%$, $\text{N}_2 = 3\%$, $\text{O}_2 = 2\%$ and $\text{CO}_2 = 3\%$. Calculate volume and weight of air required for complete combustion of 1m^3 of fuel. (Mol. wt. of air = 28.949) 6

- (b) Explain conventional and green chemistry route of production of Indigo dye. Highlight the green chemistry principle involved. 5
- (c) How do the following factors affect the rate of corrosion ? 4
- (i) Relative areas of anodic and cathodic parts.
 - (ii) Position of metal in galvanic series.
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) Explain differential aeration corrosion with the help of a suitable example. 5
- (c) Explain laminar composites with suitable example. 4
5. (a) What is biodiesel ? Explain method to obtain biodiesel from vegetable oil. What are the advantages of biodiesel ? 6
- (b) What is Powder metallurgy ? Explain Powder Injection moulding method of compaction. 5
- (c) Define matrix phase of composite material. State functions of matrix phase. 4
6. (a) What is the principle of cathodic protection method of corrosion control ? Explain Sacrificial anodic protection method. 5
- (b) 2.5 g. of a coal sample was analysed for nitrogen content by Kjeldahl's method. The liberated ammonia required 12.7ml of 0.5N H_2SO_4 solution for neutralization. In a separate experiment, using Bomb calorimeter, 1.5 g of coal sample gave 0.28g of BaSO_4 . Calculate percentage Nitrogen and Sulphur in the sample. 5
- (c) How are plain carbon steels classified based on carbon content ? What are the drawbacks of plain carbon steels? 5

QP Code : 11867

(2 Hours)

[Total Marks : 60

- N.B. :** (1) Questions No. 1 is **compulsory**.
 (2) Attempt any **three** questions from Q. Nos. 2 to 6.
 (3) Assume **suitable** data wherever **required**.

1. Attempt any **five** :-

15

- (a) A Light of wavelength 5880 \AA is incident on a thin film of glass of R.I. = 1.5 such that the angle of refraction in the plate is 60° . Calculate the smallest thickness of the plate which will make it dark by reflection.
- (b) What is grating and grating element ?
- (c) Define the terms :-
 (i) Total internal reflection
 (ii) Numerical Aperature
 (iii) Acceptance angle.
- (d) Differentiate spontaneous and stimulated emission of radiation.
- (e) An electron is bound in one dimensional potential well of width 2 \AA but of infinite height. Find its energy values in second excited state.
- (f) In phase measurement by lissajous pattern ellipse is obtained with major axis of 2 cm and minor axis of 0.8 cm. Calculate phase change.
- (g) Why is superconductor termed as 'Perfect Diamagnet.'

2. (a) With proper digram and necessary expressions explain how Newton's ring experiment is useful to determine the radius of curvature of planoconvex lens. 8
- (b) Derive the expression for numerical Aperature for a step Index fibre. The N. A. of an optical fiber is 0.5 and core R.I. is 1.54. Find refractive index of cladding. 7
3. (a) With neat energy level diagram describe the construction and working of He-Ne Laser. 8
- (b) Explain the interference in thin parallel film and derive the expression for path difference between reflected rays, hence obtain the conditions of maxima and minima for interference with monochromatic light. 7
4. (a) For plane transmission grating prove that $d \sin \theta = n\lambda$, $n = 1, 2, 3, \dots$ 5
- (b) What is Heisenberg's uncertainty principle ? Prove that electron cannot servive in the nucleous. 5
- (c) Differentiate Type-I and TYPe-II superconductors. 5

GN-Con.:7369-14.

[TURN OVER

5. (a) Calculate the minimum no. of lines in a grating which will just resolve in the first order whose wavelengths are 5890 \AA and 5896 \AA . 5
- (b) Derive one dimensional time dependent schrodinger equation for matter wave. 5
- (c) Explain with neat diagram principle and working of SEM. 5
6. (a) An electron and a photon each have a wavelength of 2\AA . What are their momentum and energies ? 5
- (b) Explain construction and working of cathode Ray Oscilloscope. 5
- (c) What are carbon nano tubes ? Write their properties. 5

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(REVISED COURSE)

(2 Hours)

[Total Marks : 46

- N. B. :** (1) Question no. 1 is **compulsory**.
 (2) Attempt any **three** questions out of the remaining **five** questions.
 (3) Answers to all the sub-questions should be attempted and grouped together.
 (4) **Figures** to the **right** indicate **full marks**.

1. (a) Discuss the importance of body language in face-to-face communication. 3
 (b) Why should one use a courteous and positive tone in a business letter? 2
 (c) Classify the following statements as instruction, caution, warning and note: 2
 1. Always use good quality printing paper for better results.
 2. Do not touch the connections with wet hands.
 3. Set the knob to "Regular wash".
 4. Do not expose camera lens to direct sunlight.
 (d) Do as directed: 3
 (i) He took a _____ (loan/lone) from the bank. (Choose the correct word)
 (ii) The test was _____ than I thought. (Use the correct comparative form of "easy")
 (iii) The arrive of the passengers caused confusion. (Choose the correct form of the underlined word).
2. (a) Explain the following terms used to describe the communication process: 4
 Feedback, message, barrier, encoding.
 (b) Draw a diagram of the Semi-block letter format. 3
 (c) The following is a description of the process of recording videos on a handycam. 3
 Change it into a set of numbered instructions.

A cassette is inserted into the camcorder. The lens cap is removed. The button marked OPEN is pressed to reveal the LCD panel. The POWER button is switched down to light up the CAMERA-TAPE lamp. The REC START/STOP button is pressed. The recording is started. The same button is pressed to stop recording.

3. (a) List two advantages each of oral and written communication. 4
 (b) As the coordinator of a youth festival in your institute, you had placed an order 6
 for T-shirts with a garment supplier. When the T-shirts arrived, you found that the slogan on the T-shirts contained spelling mistakes and the colour of the logo was blue and not green as specified by you. Write a letter of claim to the supplier asking him to take back the defective T-shirts and to grant you a complete refund. (Use the complete-block format)

[TURN OVER

4. (a) Your friend wishes to be a more effective listener. What tips would you give him/her? 4
- (b) As the Purchase Officer of a company, you wish to invite a quotation for furniture for the seminar hall. Write a letter to "Great Offices", 41, Kaveri Complex, M.G. Road, Oshiwara, Andheri (W), Mumbai-400058. 6
5. (a) Answer the following in five-six sentences each: 4
- (i) "Silence speaks louder than words". Discuss.
- (ii) What is grapevine? What are its merits and demerits?
- (b) The following letter is written in a negative tone. Make the necessary changes without changing the meaning so that it sounds positive: 4
- Dear Mr. Jagtiani
- You cannot get a replacement on your defective computer because it clearly falls outside the warranty period. You should at least have checked the warranty date before making such a complaint.
- As per company policy, we can only repair the defective parts. Our technician makes home calls only on Wednesdays between 3:00 pm and 5:00 pm and only cheque payments are accepted.
- We trust you will not complain again.
- (c) Give one word for the following: (any two) 2
- (i) A place in which people are confined to or kept in as punishment for a crime
- (ii) A compulsory contribution from one's income imposed by the government
- (iii) The presence of harmful substances in the environment that affect health
6. (a) Complete the following sentences by inserting the right category word and function for the following objects: (any two) 2
- (i) A pressure cooker is a/an _____ used to _____.
- (ii) A barometer is a/an _____ used to _____.
- (iii) A lift is a/an _____ used to _____.
- (iv) A mini-drafter is a/an _____ used to _____.
- (b) Match the following: 2
- (i) Kinesics (a) The study of space as a communicative system
- (ii) Haptics (b) The study of movements of the body as related to speech
- (iii) Oculesics (c) The study of touch
- (iv) Proxemics (d) The study of eye-contact
- (e) The study of silence as a means of non-verbal communication

[TURN OVER

(c) Read the following passage and answer the questions given below:

It was once believed that being overweight was healthy, but nowadays few people subscribe to this viewpoint. While many people are fighting the battle to lose weight, studies are being conducted concerning the appetite and how it is controlled by both emotional and biochemical factors. Some of the conclusions of these studies may give insights into how to deal with weight problems. For example, when several hundred people were asked about their eating habits in times of stress, 44 percent said they reacted to stressful situations by eating. Further investigations with both humans and animals indicated that it is not food that relieves tension but rather the act of chewing.

A test in which subjects were blindfolded showed that obese people have a keener sense of taste and crave more flavorful food than people who are not extremely overweight. When deprived of variety and intensity of tastes, obese people are rarely satisfied and consequently eat more to fulfill this need. Also, blood samples taken from people after they were shown a picture of food revealed that overweight people reacted with an increase in blood insulin, a chemical associated with appetite. This did not happen to average-weighted people.

In another experiment, results showed that certain people have a specific, biologically induced hunger for carbohydrates. When people eat carbohydrates, the level of serotonin, a neurotransmitter in the brain, rises. Enough serotonin produces a sense of satiation, and as a result, their hunger for carbohydrates subsides.

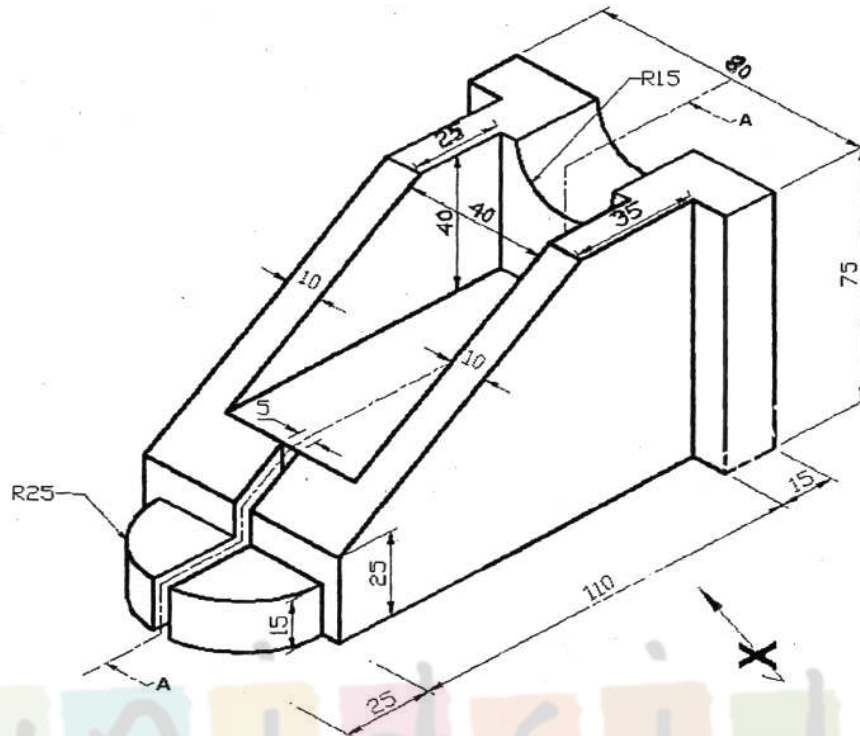
Exercise has been recommended as an important part of a weight-loss program. However, it has been found that mild exercise, such as using the stairs instead of the elevator, is better in the long run than taking on a strenuous program, such as jogging, which many people find difficult to continue over long periods of time and which also increases appetite.

Choose the right options:

- (i) What is the main purpose of the passage? 1
- (a) To discuss the health problems caused by being overweight
- (b) To recommend a weight-loss program for the obese
- (c) To help overweight people overcome their eating problem
- (d) To present research into the factors causing obesity
- (ii) The author mentions people's eating habits during times of stress to show that 1
- (a) Overweight people are tense
- (b) Thin people don't eat when under stress
- (c) A large percentage of people deal with stress by eating
- (d) 56 percent of the population isn't overweight
- (iii) The word "crave" in paragraph 2 is closest in meaning to: 1
- (a) Devour (b) absorb (c) savor (d) desire

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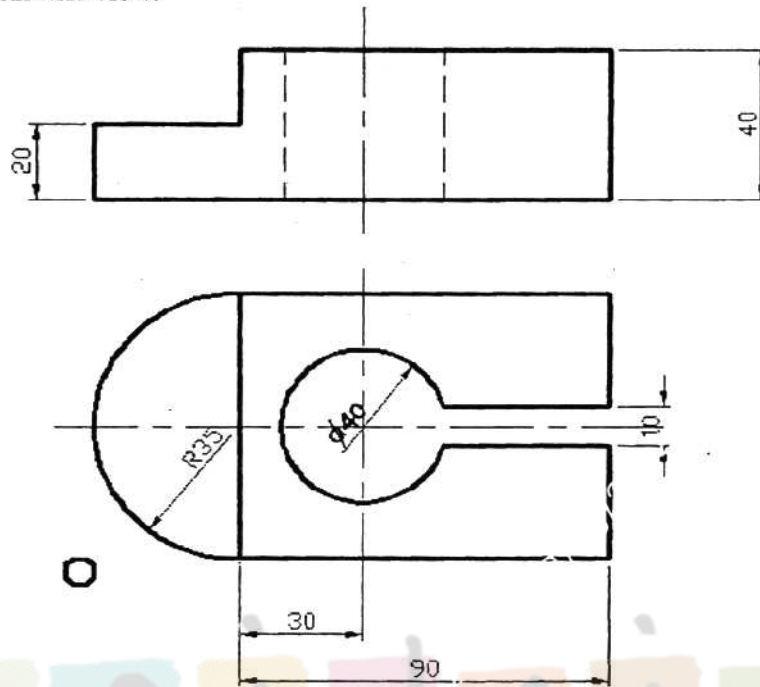
- (iv) Paragraph 2 supports which of the following conclusions? 1
- (a) Thin people don't enjoy food as much as overweight people do
 - (b) A variety of foods and strong flavors satisfy heavy people
 - (c) Overweight people have an abnormal sense of taste
 - (d) Deprivation of food makes people fat.
- (v) According to the passage 1
- (a) insulin increases in the bloodstream when people eat large amounts of food.
 - (b) insulin can be used to lessen the appetite
 - (c) insulin causes a chemical reaction when food is seen
 - (d) insulin levels don't change in average-weight people who see food.
- (vi) Give synonyms for the following words: 1
- (a) subside
 - (b) strenuous



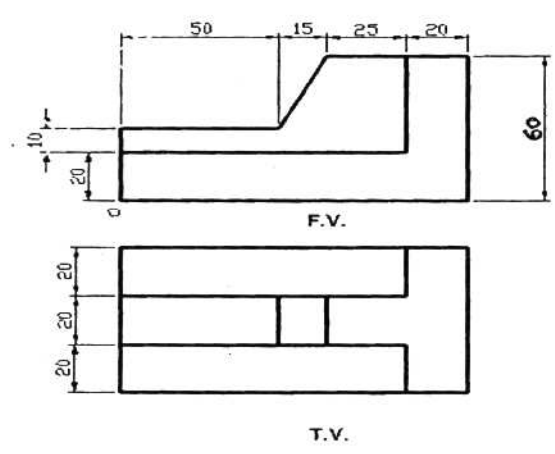
- Q3 A square pyramid of side of base 40 mm and axis 70 mm has one of the triangular faces on the VP. Draw the projections when the front view of the axis is inclined 30° to the HP, keeping the apex nearer to the observer. [15]
- Q4 A right circular cone of base circle diameter 50 mm and axis 60 mm long is resting on its base on HP. It is cut by a section plane which is perpendicular to VP and inclined to HP such that the plane is parallel to the end generator and 10 mm away from it. Draw the front view, the sectional top view and the true shape of section. Also draw the development of the cone after removing the portion containing the apex. [15]
- Q5 a) A hexagonal prism of 35mm edge of base and 70 mm length of axis is having an edge of base in the HP and the rectangular face containing that edge is inclined 30° to HP and perpendicular to VP. Draw the projections. [6]

[TURN OVER

- b) The orthographic projections of an object is given in the figure below. Draw [9]
the isometric view.



- Q6 a) The distance between the end projectors of a line AB is 40 mm. The end point A is 15 mm above the HP and 20 mm in front of the VP. The line is inclined 30° to the HP. Draw the projections if the true length of the line is 80 mm. Find its inclination with the VP. Take end point B in the 1st quadrant. [7]
- b) Draw the isometric view of the given views. [8]



(REVISED COURSE)

QP Code : **11859**

(3 Hours)

Total Marks : 80

- N. B. :** (1) Question No.1 is compulsory.
 (2) Attempt **any three** questions of the remaining **five**.
 (3) **figures** to the right indicate **full marks**.

1. (a) Evaluate $\int_0^2 x^4 (8-x^3)^{-1/3} dx$ 3
- (b) Solve $\frac{d^4 y}{dx^4} + 2\frac{d^2 y}{dx^2} + y = 0$ 3
- (c) Prove that $E = 1 + \Delta = e^{4D}$ 3
- (d) Solve $[x\sqrt{x^2+y^2} - y]dx + [y\sqrt{x^2+y^2} - x]dy = 0$ 3
- (e) Change to polar coordinates and evaluate $\int_0^{2a} \int_0^{\sqrt{2ax-x^2}} \frac{x}{\sqrt{x^2+y^2}} dy dx$ 4
- (f) Evaluate $\int_a^1 \int_a^x e^{x+y} dy dx$. 4
2. (a) Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$ 6
- (b) Change the order of integration and evaluate $\int_0^a \int_{y/2}^y \frac{y}{(a-x)\sqrt{ax-y^2}} dx dy$ 6
- (c) Prove that $\int_0^\infty \cos \lambda x (e^{-ax} - e^{-bx}) dx = \frac{1}{2} \log \left(\frac{b^2 + \lambda^2}{a^2 + \lambda^2} \right)$, $a > 0, b > 0$ using DUIS 8
 rule
3. (a) Evaluate $\iiint \frac{dx dy dz}{x^2 + y^2 + z^2}$ throughout the volume of the sphere 6
 $x^2 + y^2 + z^2 = a^2$
- (b) Find the area common to the cardioids $r = a(1 + \cos \theta)$ and $r = a(1 - \cos \theta)$. 6
- (c) Apply the method of variation of parameters to solve 8
 $\frac{d^2 y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{2x} \sec^2 x$
4. (a) Find the length of one arc of the cycloid $x = a(\theta - \sin \theta)$ and $y = a(1 - \cos \theta)$ 6
- (b) Solve $\frac{d^2 y}{dx^2} + 2y = x^2 e^{3x} + e^x \cos x$ 6

- (c) Apply Runge- kutla method of fourth order to find an approximate value of y at $x = 1.2$ if $\frac{dy}{dx} = x^2 + y^2$, given that $y = 1.5$ when $x = 1$ choosing $h = 0.1$ 8
5. (a) Solve $[xy^2 - e^{1/x^3}] dx - yx^2 dy = 0$ 6
- (b) If y satisfies the equation $\frac{dy}{dx} = x^2 y - 1$ and with $y = 1$ when $x = 0$, using Taylor's series method for y about $x = 0$, find y when $x = 0.1$ and $x = 0.2$ 6
- (c) Compute the value of the definite integral $\int_{-1}^1 \frac{dx}{1+x^2}$ by using 8
- (i) Trapezoidal rule
- (ii) Simpson's $\left(\frac{1}{3}\right)^{\text{rd}}$ rule
- (iii) Simpson's $\left(\frac{3}{8}\right)^{\text{th}}$ rule. Compare result with exact values.
6. (a) A radial displacement 'u' in rotating a disc at a distance 'r' from the axis in given by $\frac{d^2 u}{dr^2} + \frac{1}{r} \frac{du}{dr} - \frac{u}{r^2} + kr = 0$. Find the displacement given $u = 0$ when $r = 0$ and $r = a$ 6
- (b) Evaluate $\iint x^2 dx dy$ over the region bounded by $xy = a^2$, $x = 2a$, $y = 0$ and $y = x$ in the first quadrant. 6
- (c) Find the volume of the tetrahedron bounded by the co-ordinate planes and the plane $\frac{x}{2} + \frac{y}{3} + \frac{z}{4} = 1$ 8

(REVISED COURSE)QP Code : **11879**

(3 Hours)

[Total Marks : 80

- N.B.** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **three** questions from remaining **five** questions.
 (3) Assume suitable **data** wherever **necessary**.

1. (a) Explain the difference in using call by reference and call by value methods for argument passing, for swapping 2 numbers. 8
 (b) What is significance of storage class ? Illustrate each storage class with example. 10
 (c) Find the output of the following code : 2

```
main()
{
int a[ ]={10,20,30,40,50};
int *j, *k;
j=&a[4];
k=(a+4);
if(j==k)
printf("Both pointers points to same location");
else
printf("Both pointers does not point to same location");
}
```

2. (a) Choose the correct answer for the following : 5
- (1) Parameters passed as arguments to the function call are called as

(a) Actual parameters	(c) No parameters
(b) Formal Parameters	(d) None of these
 - (2) Which of the following return statement in function has error

(a) return	(c) return(expression)
(b) return(0)	(d) None of these
 - (3) Which of the following is not jump statement

(a) for	(c) continue
(b) break	(d) goto
 - (4) Which of the following is an exit controlled loop.

(a) for	(c) do-while
(b) while	(d) if-else
 - (5) In array a[2][3] = { 10, 20, 30, 40, 50 } then a[0][1] element is

(a) 10	(c) 40
(b) 50	(d) 20

- (b) Write a program using function to print first 'n' numbers in Fibonacci series. 5
 (c) Define structure within structure consisting of following elements :— 10

- (i) Employee code
- (ii) Employee name
- (iii) Employee salary
- (iv) Employee date of joining

Write a program to read atleast 10 records and display them.

[TURN OVER

3. (a) Write an program to implement calculator with following operations :— 6
 (i) Add two numbers (iii) Division two numbers
 (ii) Subtract two numbers (iv) Multiply two numbers
- (b) Write a program to find GCD and LCM of 2 nos. 6
- (c) Write a program to print the following pattern. (Note : Not only 4 lines, it should 8
 print n lines taken from user)

```

      A
     B  B
    C  C  C
   D  D  D  D
  
```

4. (a) Write a program to find the biggest of given 3 no's using conditional operator. 5
 (b) Write a program to check whether entered string is palindrome or not. 5
 (c) Write a program in C to read and display elements of a square (2D) matrix and 10
 check whether the entered matrix is symmetric or not.
5. (a) Evaluate following expression :— 3
 (i) $!(5+5 > 10)$
 (ii) $5 + 5 == 10 \parallel 1 + 3 == 5$
 (iii) $5.10 \parallel 10 < 20 \&\& 3 < 5$
- (b) An electric power distribution company charges its domestic consumer as follows : 7

Consumption Units	Rate of Charge
0-200	0.50 per unit
201-400	Rs. 100 plus Rs. 0.65 per unit excess of 200
401-600	Rs. 230 plus Rs. 0.85 per unit excess of 400
601-above	Rs. 390 plus Rs. 1.00 per unit excess of 600

Program should read the units consumed for a customer and calculate the total bill.

- (c) Four experiments are performed, each experiment consisting of six test results. 10
 The result for each experiment follows. WAP to compute and display the average
 of the test results for each experiment.

1 st Experiment results	23.2	31.5	16.9	28.0	26.3	28.2
2nd Experiment results	34.8	45.2	20.8	39.4	33.4	36.8
3rd Experiment results	19.4	50.6	45.1	20.8	50.6	13.4
4th Experiment results	36.9	42.7	20.8	10.2	16.8	42.7

6. (a) Explain with example bitwise operators in C language. 5
 (b) Write a program using recursive function 'power' to compute x^n 8
 $\text{power}(x,n) = 1$ if $n = 0$
 $\text{power}(x,n) = x$ if $n = 1$
 $\text{power}(x,n) = x * \text{power}(x, n - 1)$ otherwise
- (c) Write a user defined function to copy one string to another. 4
 (d) What is a File ? What are the different mode in which we can open a file ? What 3
 are the different functions to read and write to file ?