



Time: 3 Hours

End-Term Exam, Nov. 26, 2015

Maximum Marks: 35

Note: Attempt the Section A and Section B on separate answer sheets.

Section A

- 1 Referring to the circuit of Figure 1, determine the maximum positive current to which the source I_x can be set before any resistor exceeds its power rating and overheats. [5 marks]

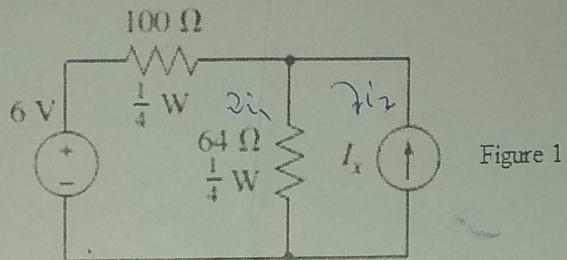


Figure 1

2. The Zener diode shown in Figure 2 regulates at 50 V over a range of diode currents from 5 to 40 mA.
- If supply voltage $V = 200 \text{ V}$, calculate R to allow voltage regulation from a load current $I_L = 0$ up to $I_{L,max}$. What is $I_{L,max}$? [3 marks]
 - If R is set as in part a) and the load current is set at $I_L = 25 \text{ mA}$, what are the limits between which V may vary without loss of regulation in the circuit? [3 marks]

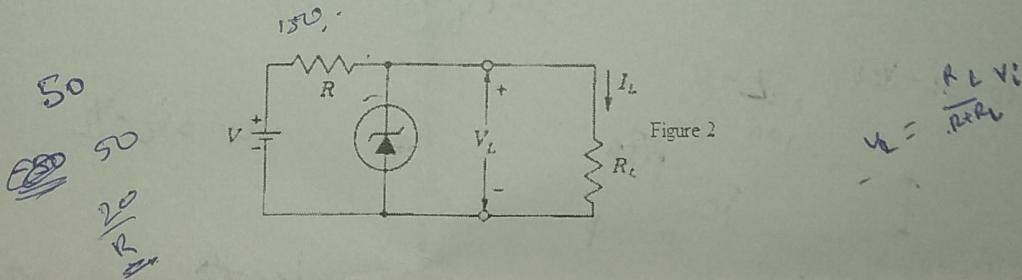
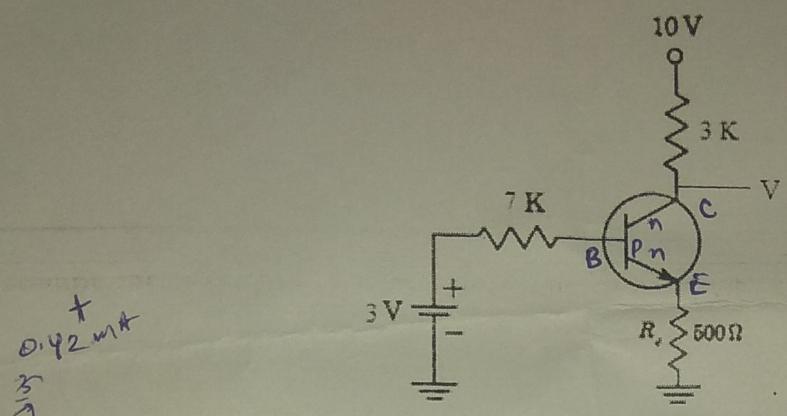


Figure 2

3. A silicon npn transistor with $\beta = 100$ is used in the circuit shown in Figure 3. For silicon npn transistor $V_{CE,sat} = 0.2 \text{ V}$, $V_{BE,sat} = 0.8 \text{ V}$, $V_{BE,active} = 0.7 \text{ V}$, and $V_{BE,cutoff} = 0.0 \text{ V}$.
- Find if the transistor is in cut-off, saturation, or in the active region. [4 marks]
 - Find V . [2 marks]
 - Find the minimum value for the emitter resistance R_e for which the transistor operates in the active region. [3 marks]

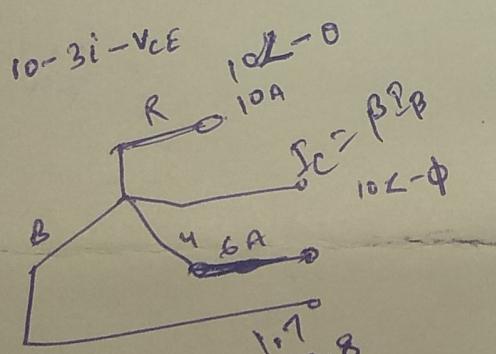


Section B

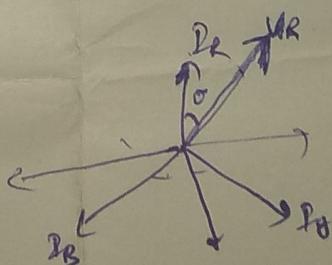
- ✓ 4. A 20 kW compound generator works on full load with a terminal voltage of 230 V. The armature, series and shunt field resistance are 0.1, 0.05 and 115 Ω, respectively. Calculate the generated e.m.f. when the generator is connected in short-shunt. [5 marks]
- ✓ 5. The armature resistance of a 200 V shunt motor is 0.4 ohm and no-load current is 0.2 A. When loaded and taking an armature current of 50 A, the speed is 1200 rpm. Find the no load speed of motor. [5 marks]
- ✓ 6. In a 3-phase, 4 wire system (R, Y, B and N), two phases have currents 10 A and 6 A at lagging power factors of 0.8 and 0.6 respectively while third phase is open circuited. Calculate the current in neutral and draw the vector diagram. [5 marks]

$$I_B + I_L = I_E$$

$$3 - 7i_B - v_{BE} - i_E 500 \omega$$



$$10 - 3i_C - v_{CE} - i_E 500 \omega$$



$$10 - 3i_C - v_{CB} - 7i_B - 3 = 0$$

$$7 - 7i_B - 3i_C - v_{CB} = 0$$

$$0.30 \times 1.73$$



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भारतीय सूचना प्रौद्योगिकी, अभिकल्पन
एवं विनिर्माण संस्थान जबलपुर

PDPM

Indian Institute of Information Technology,
Design & Manufacturing Jabalpur

Dumna Airport Road, PO: Khamaria, Jabalpur 482005, INDIA

(2)

Fundamentals of Computing (IT101)

Quiz (31-08-2015)

Time: 01 hours

Max. Marks: 10

Note: Attempt all questions.

- Q1. You have 12 marbles. They all weigh the same, except one. You don't know if that one is heavier or lighter. You have a balance scale. What would be the minimum number of weighing required to find the odd one 2
- Q2. Write an algorithm to compute matrix multiplication. 2
- Q3. Write an algorithm to convert given temperature in any unit (degree Celsius, Fahrenheit and Kelvin) to another unit of temperature. 2
- Q4. Devise an algorithm to calculate the angle between the hour and minute hands of an analog clock. 2
- Q5. Write algorithm for following pattern for given input n: 2
- 1
1 2 1
1 2 4 2 1
1 2 4 8 4 2 1
1 2 4 8 16 8 4 2 1
1 2 4 8 16 32 16 8 4 2 1
1 2 4 8 16 32 64 32 16 8 4 2 1
1 2 4 8 16 32 64 128 64 32 16 8 4 2 1



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Dumna Airport Road, PO: Khamaria, Jabalpur 482005, INDIA

(3)

Fundamentals of Computing (IT101)
End-Semester Examination (23-11-2015)

Time: 03 hours

Max. Marks: 30

Note: Attempt all questions.

- Q.1.** Write an algorithm and implement it in C to calculate $y = 2 + x + x^2 + x^3 + x^4 + \dots + x^n$ (x & n are non-negative integers). **2+4**
- Q.2.** Make a database of Books by using structure. This database will have following fields: **2+4+2**
Title, Author, Publisher, no. of pages and acceleration no. Choose appropriate datatype for the corresponding fields. Store your database in a file “library.txt” and also print the content of this file on console.
- Q.3.** Write a C program to add two matrix of size $n \times n$ using pointers. **4+2**
- Q.4.** Write an algorithm and implement it using C to delete an element (given by user) of an array having 100 elements. **2+3**
- Q.5.** Write a C program to count all the vowels present in the string “This is Indian Institute of Information Technology, Design and Manufacturing Jabalpur”. **5**

End semester
(NS-102) Physics I



Full marks 40

Time Duration (Max) - 180 minutes

Nov 27, 2015

Instructions:

- Marks are given at the right side of each question
- Illegible writing will get zero mark
- In this question paper, questions are grouped in two sections (A and B); you must have to write answer of separate section on separate answer sheet.

Section A

1. State and prove the parallel axis theorem for moment of inertia of a rigid body. [4]
2. Find the moment of inertia of a disk about an axis at the rim (perpendicular to the plane of the disk). [1]
3. A body of weight 4 kg is attached to the end of a rope coiled around a pulley of weight 12 kg and radius 0.2m. (a) What is the acceleration of the body? (b) Calculate the energy after 1 second? [4]
4. Prove that $\vec{V} = \vec{\omega} \times \vec{r}$; (where \vec{V} , $\vec{\omega}$ and \vec{r} are vectors) for a rotating rigid body. [3]
5. Write a short note on gyroscope angular velocity of precession. Also prove that the precessional velocity is independent of the angle of elevation. [2+2]
6. Derive the relationship between angular momentum and tensor of inertia. [5]
7. Consider a dumbbell made of two spheres of radius "R" and mass "M" separated by a thin massless rod. The distance between the centers is 2L. The body is rotating about some axis through its center of mass. At a certain instant the rod coincides with the Z-axis, and ω lies in the YZ-plane i.e. $\vec{\omega} = \omega_y \hat{j} + \omega_z \hat{k}$. Find the direction and magnitude of the angular momentum. [3]
8. (a) Derive the equation of motion of a damped harmonic oscillator (b) Draw the oscillations for lightly and heavily damped conditions. (c) Also, prove that the energy decreases exponentially with time. [2+2+2]

Section B

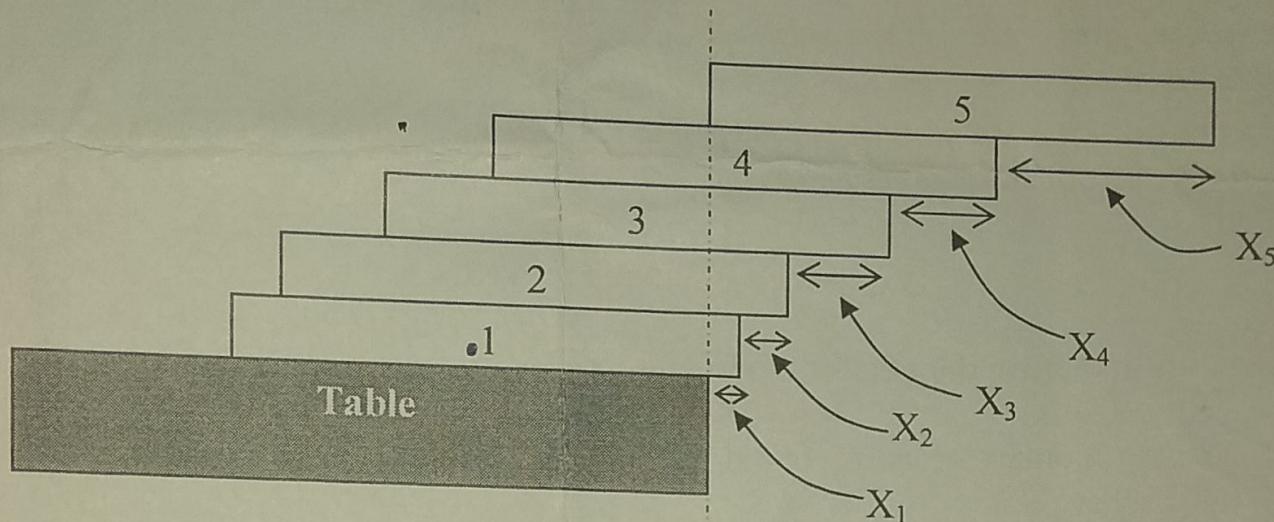
9. In a projectile motion, what is the maximum angle with the horizontal at which a stone can be thrown so that the stone always moves away from the thrower? [5]

[Signature]

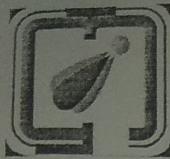
(4)

10. In IITDM library, five same books (say Kleppner's Physics) (means same dimension, same mass) are kept on a table. I have arranged it one over another in such a way that the uppermost book came out of the table completely (see fig.) and this arrangement is in equilibrium. Find the one possible value of x_1, x_2, x_3, x_4 and x_5 . (Hint; So simple ☺)

[5]

The End

(5)



Time: 1 Hour

Quiz-1, Sep. 8, 2015

Maximum Marks: 10

- ✓ 1. Determine the nodal voltages in the circuit of Figure-1. [3 marks]

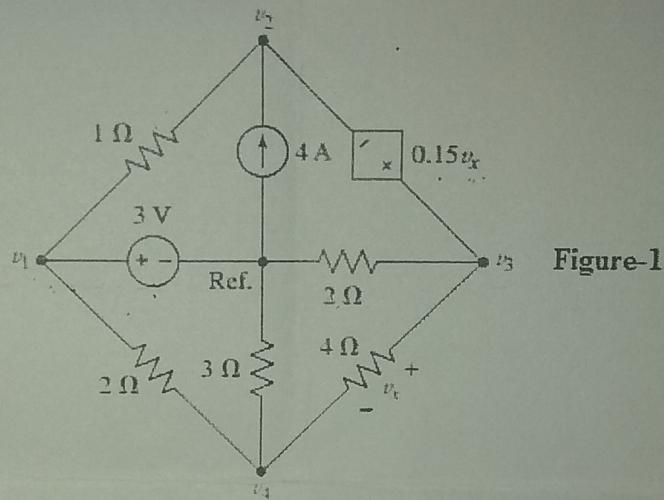


Figure-1

- ✓ 2. Using the superposition theorem, determine the voltage labelled in the circuit of Figure-2. [3 marks]

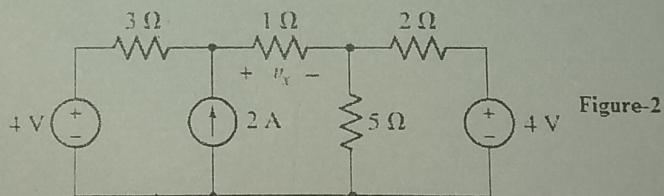


Figure-2

3. Select a value for R_L in Figure-3 such that maximum power is delivered to it from the circuit. [4 marks]

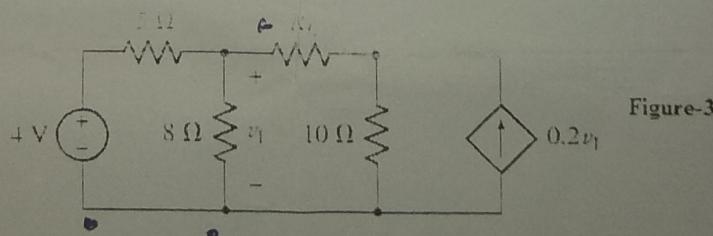
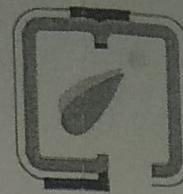


Figure-3

(6)



NS 102 Engineering Physics I

Date: 28/10/2015

QUIZ -2

MARKS-10

TIME-45 MINUTES

Q.1. Can the torque on a particle be zero without the force being zero? Explain briefly. [3]

Q.2. Find the moment of inertia of a sphere of mass M (uniform) and radius R , axis through the centre. [3]

Q.3. A disk of radius R and mass M rolls without slipping down a plane inclined at angle θ . The coefficient of friction is μ . What is the maximum value of θ for the disk to roll without slipping? [4]

$\frac{1}{2} M R^2$

R^2

R^2

$\frac{1}{2} M R^2$
 $2 \pi R^2 \rho$
 $\frac{1}{2} M R^2$

PDPM INDIAN INSTITUTE OF INFORMATION TECHNOLOGY DESIGN AND MANUFACTURING

Btech 2015 End- Sem Examination 2015

(A)

HS 101 Effective Communication

Time: 3 hrs.

Max. Marks- 50

Note: Attempt both the Sections

Section A

Q.1. How can you make your communication more effective? (100 words) 5 marks

Q.2. Expand any one of the following topics. (100 words) 5 marks

1. Pen is mightier than Sword.

✓ All that glitters is not gold.

Q.3. A. Use the following words in your own sentences. (Any five) 2.5 marks

1. Feign, 2. Waft, 3. Akin , 4. Perplex, 5. Abandon, 6. Remorse.

Q.3. B. Transcribe the following words. (Any five) 2.5 marks

1. bead, 2.cot, 3. Garden, 4. Poor, 5. Caught, 6. Madam.

Q.4. What is Group Discussion? Mention some of the personality traits that you need to exhibit during GD. (100 words) 5 marks

Q.5. What preparations you need to do before making a good presentation? (100 words) 5 marks

Section B

Q.1. Identify the Clause Pattern (any five) 5 marks

a. He was given a job.

S V C

b. Titanic movie made people cry.

c. They walked very fast.

S V A

d. Chandra complained to the police.

S V C

e. Seema gave her brother a present.

S V O_i O_d

(F)

f. We consider her the best.

S V O A

Q.2. Write a long report containing Title paper, findings and recommendations on the report submitted by the Secretary of the fact finding committee that has enquired into a fight incident which happened in the college canteen of GSM College. (150 words)

10 marks

Q.3. At a Student affairs Committee meeting of the B.D. Institute, conducted on 10 Dec, 2015 in Conference room of the Institute at 1pm, following business was transacted. Write the minutes of the meeting.

1. Appointment of student co-ordinators for Social service group.

2. Construction of a Swimming pool.

3. Collecting books from book donors.

4. Extra classes for the weak students

5. Planning for the New Year's celebration in the institute.

5 marks

Q. 4. Assuming you are applying for the post of Manager in the field of your choice, write a functional CV along with application.

5 marks

Brown

Munir

Box
P. outcome.



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(B)

Quiz 2 (October 27, 2015)
(Fundamentals of Electrical & Electronics Engineering: ES-101)

Time: 60 minutes

Full Marks: 12

Q.1. A 50 kVA, 2200/220 V transformer when tested gave the following results

OC test, measurement on low voltage side: 405 W, 5 A, 220 V

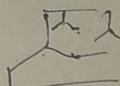
SC test, measurement on high voltage side: 805 W, 22.5 A, 95 V

Draw the equivalent circuit of the transformer referred to the high voltage side. Label all the parameters along with the units. Also find out the efficiency at unity power factor full load.

[6]

Q.2. A 440 V 3-phase, 3 wire system feeds balanced 3-phase loads in parallel; one Y-connected with each branch impedance equals to $4 + j6$ ohms and other Δ -connected with each branch impedance equal to $10 - j5$ ohms. Calculate

- i. current in each load phase.
- ii. the line current drawn from the supply.
- iii. the power factor of the entire circuit.
- iv. total power drawn.



[6]

O.C test

K $\frac{1}{T_0}$

$$Z_p = \frac{50 \times 10^3}{2200}$$



(9)

Mid semester
(NS-102) Physics I

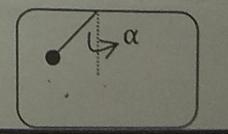
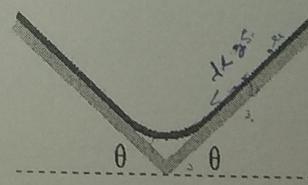
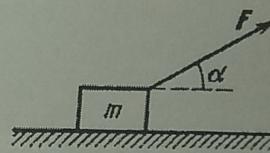
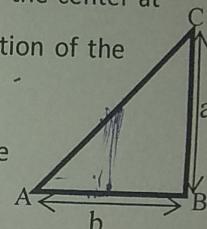


Full marks 20
Time Duration (Max) - 2 hr
September 15, 2015

Instructions:

- Must read questions carefully
- Try all questions
- Marks are given at the right side of each question
- Illegible writing will get zero mark

1. Two particles, 1 and 2, move with constant velocities \vec{V}_1 and \vec{V}_2 . At the initial moment their radius vectors are equal to \vec{r}_1 and \vec{r}_2 . How these four vectors must be interrelated for the particles to collide. [1]
2. A bead moves outward with constant speed u along the spoke of a wheel. It starts from the center at $t=0$. The angular position of the spoke is given by $\theta = \omega t$. Find the velocity and acceleration of the bead. [2]
3. Find the Center of mass of a uniform mass density triangular sheet ABC as shown in figure (taking A as origin). [3]
4. From $t=0$, a force $F = at$; (where "a" is a constant and "t" is time); is applied to a small body of mass m resting on a smooth horizontal plane. The permanent direction of this force forms an angle α with the horizontal (see fig). Find:
 - (a) the velocity of the body at the moment of its breaking off the plane;
 - (b) the distance traversed by the body up to this moment.
 [3]
5. A freight car of mass M contains a mass of sand m . At $t=0$, a constant horizontal force F is applied in the direction of rolling and at the same time a hole in the bottom is opened to let the sand flow out at constant rate dm/dt . Find the speed of the freight train when all the sand is gone. Assume the Freight train is at rest at $t=0$. [4]
6. A rope rests on V shape platform (both wings of V are at an angle θ with horizontal, as shown in fig.). The rope has uniform mass density, and its coefficient of friction with the platforms is 1. The system has left-right symmetry. What is the largest possible fraction of the rope that does not touch the platforms? What angle θ allows this maximum value? [4]
7. Consider an ideal situation, a car of mass M can move without friction on horizontal ice-slab. A simple pendulum consisting of a point mass m is suspended from the ceiling of the car by a string of length l . At the initial moment the car and the bob are at rest and the string is deflected through an angle α with the vertical. Find the velocity of the car when the string makes an angle β (where $\beta < \alpha$) with the vertical. [3]



**PDPM INDIAN INSTITUTE OF INFORMATION TECHNOLOGY DESIGN AND
MANUFACTURING**

(ID)

Mid-Sem Examination, September 2015

HS 101 Professional Communication

Time- 2 Hours

Max.Marks : 30

Note: Attempt all questions.

Q.1. Expand one of the following in your own words (100 words) **5 marks**

a. A friend in need is a friend indeed.

b. Actions speak louder than words.

Q.2. Use the following words in your own sentences (any five) **5 marks**

1. Spam, 2. ~~Splash~~, 3. ~~Data~~, 4. ~~Furnish~~, 5. Defacto, 6. Diffident.

Q.3. What do you understand by communication? Explain in detail different types of listening. (150 words) **5 marks**

Q.4. What are the characteristics of writing Technical English? (150 words) **5 marks**

Q.5. Write a long report on the student's latest choice of Careers in India. Attempt writing

a. Title Page b. Summary c. Conclusion d. Recommendation (200 words in all) **10 marks**



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Mid-Semester Examination (September 18, 2015)

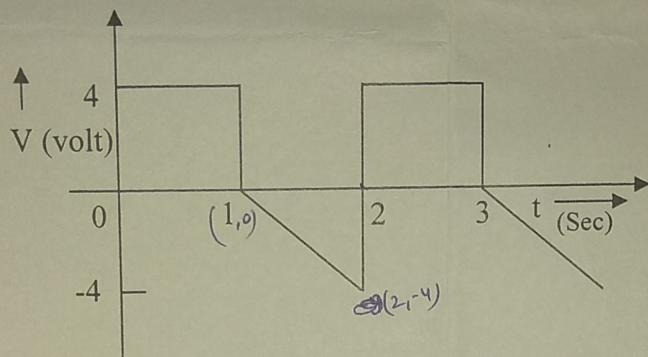
(Fundamentals of Electrical & Electronics Engineering: ES-101)

11

Time: 120 minutes

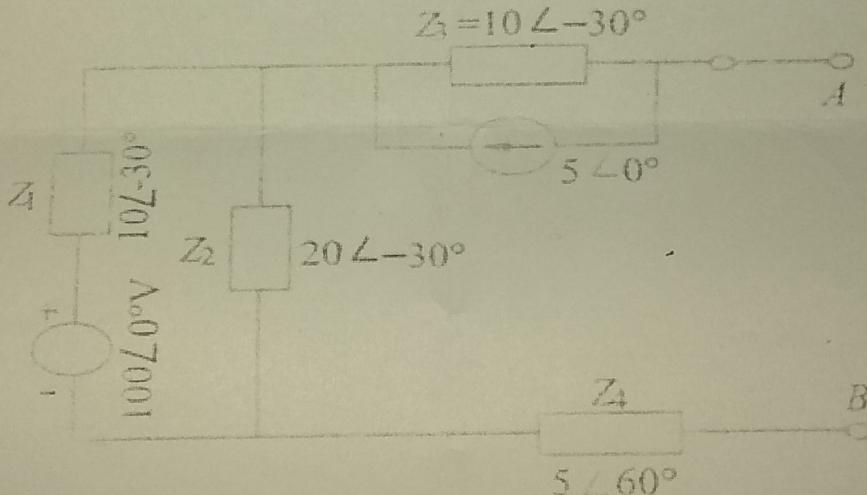
Full Marks: 20

Q.1 Calculate the RMS and Average values of the voltage wave as shown in figure given below.



[4]

Q.2. Find the Thevenin equivalent of the network given in the figure below.



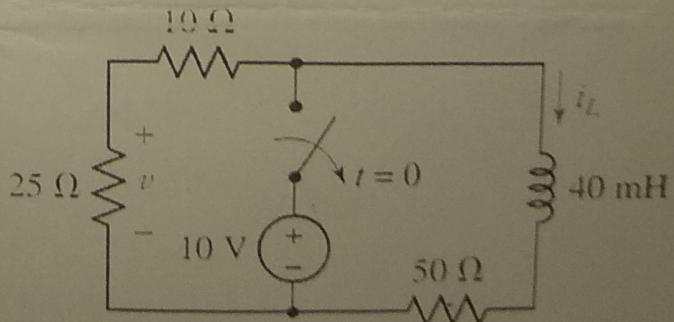
[5]

Q.3 A constant voltage at a frequency of 1 MHz is applied to a coil in series with a variable capacitor. When the capacitor is set at 500 pF, the current has its maximum value and it reduces to one-half when the capacitance is 600 pF. Find the resistance and the inductance of the coil. [5]

Q.4 The switch in the circuit shown in figure has been closed a very long time before suddenly being thrown open at $t = 0$.

(a) Obtain expressions for i_L and v for all $t \geq 0$.

(b) Calculate $i_L(t)$ and $v(t)$ at the instant just prior to the switch opening, at the instant just after the switch opening. [6]





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(12)

Fundamentals of Computing (IT101)
Mid-Semester Examination (16-09-2015)

Time: 02 hours

Max. Marks: 20

Note: Attempt all questions.

- Q.1.** Write a C program for an ATM machine to dispense the minimum currency note for a given amount provided by a user. Assume that the ATM machine has only 500, 100 and 50 Rs. currency notes. 5
- Q.2.** Suppose that there is a machine in a bank which tells the information about different interest rates given on fixed deposits. Interest rates are varying with the time of the fixed deposits. Assume if time is upto 1 year then interest will be 6%, for more than one year but less than 2 years it will be 8% and for more than 2 years it is 9.75%. Write a C program for this machine to calculate the amount after a specific time (provided by user) for a given amount (provided by user) **without** using IF or IF ELSE. 6
- Q.3.** Write a C program to convert given temperature in Celsius to another unit in Fahrenheit. 4
- Q.4.** Write a C program that accepts the radius of a circle and displays the options as follows : 5
- find diameter of a circle.($2 * \text{radius}$)
 - find area of circle. ($\pi * \text{radius} * \text{radius}$)
 - find circumference of a circle. ($2 * \pi * \text{radius}$)
 - exit.

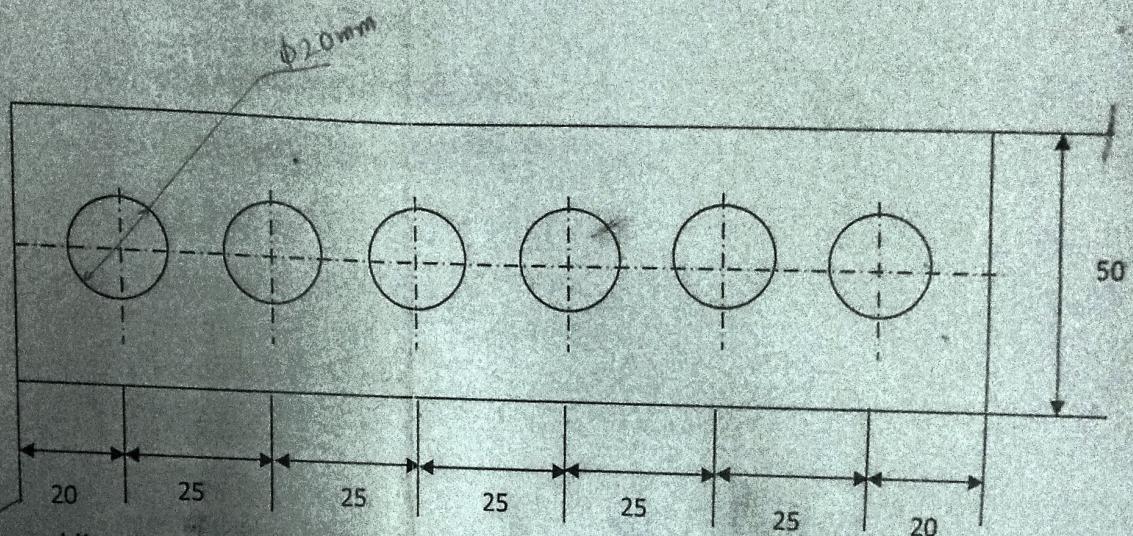
Write the C program by using switch-case and display the corresponding output.

Sheet Number 2 Class Work

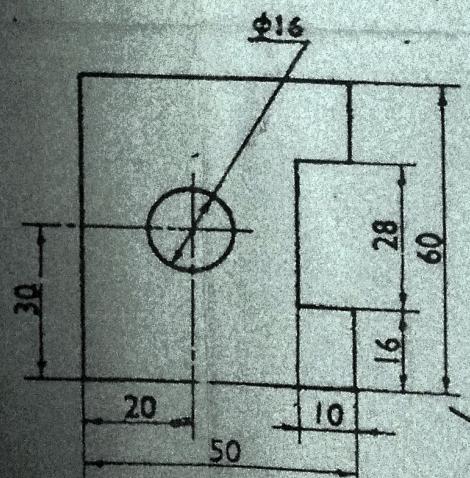
(13)

Dimensioning practice

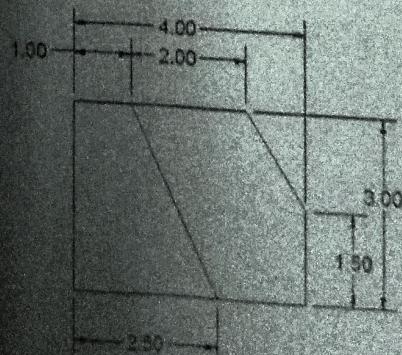
1. Use chain dimensioning method to redraw the Fig 1.



2. Use unidirectional dimensioning method and redraw the diagram shown in Fig



3. Use aligned dimensioning method and redraw the diagram shown in Fig 3.



(14)

Indian Institute of Information Technology, Design and Manufacturing Jabalpur

Quiz I Examination: 2015-2016

Sub: NS103: Mathematics for Continuous and Discrete domain

Time: 1 Hours

Max. Marks: 15

- All questions are compulsory.
- Start each question from new page and write every step for proper evaluation.

1. Find all the roots of $e^{iz} \sin z = \frac{\sqrt{3}}{2}$, where $z \in \mathbb{C}$. [4]

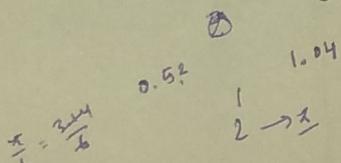
✓ 2. Find the the image of subsets

~~(a)~~) $D_1 = \{z = x + iy \in \mathbb{C} : 2 \leq x \leq 3, y \in \mathbb{R}\}$

~~(b)~~) $D_2 = \{z = x + iy \in \mathbb{C} : \frac{\pi}{6} \leq y \leq \frac{\pi}{3}, x \in \mathbb{R}\}$

under the transformation $f(z) = e^z$. Pictorially find $D_1 \cap D_2$ and $f(D_1 \cap D_2)$. [6]

✓ 3. Consider the mapping $w = \frac{1}{z}$ and determine the region in w -plane corresponding to the region bounded by $x = 0, y = 0, x^2 + y^2 = 1$. Please shade the region in order to show the corresponding region. [5]



Feb 10, 2016

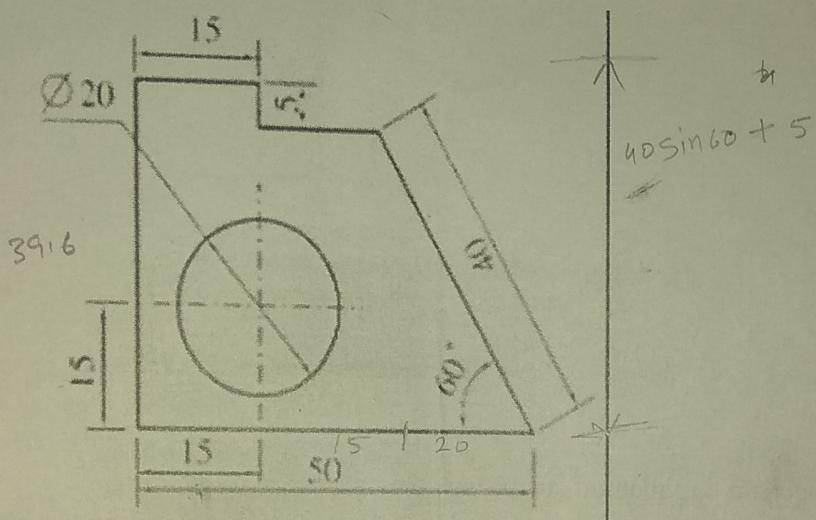
$$e^{iz} \sin z = \frac{\sqrt{3}}{2}$$

$$e^{iz} \sin z =$$

(15)

Home Work on Dimension Practice

1. Use unidirectional dimensioning method and redraw the diagram shown in Fig



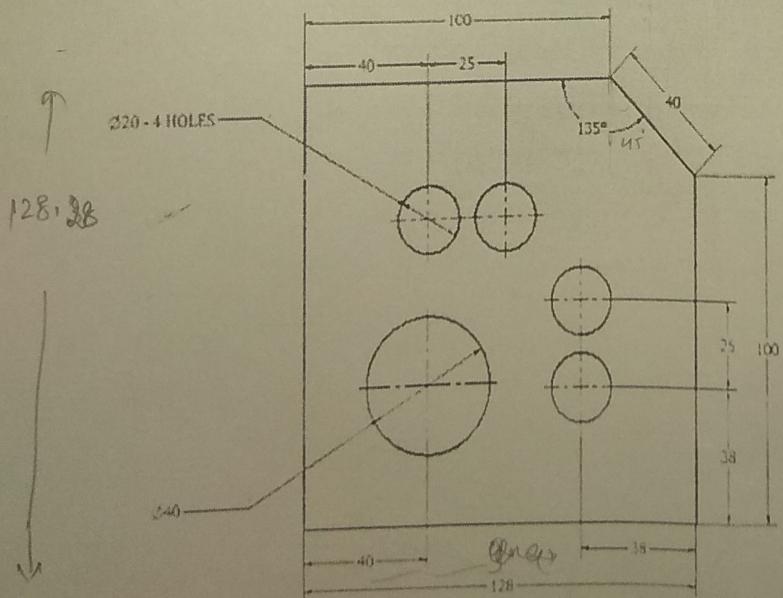
$$\frac{5}{2} \quad \frac{1.73}{2}$$

$$20 \quad 2 \quad 17.3$$

$$34+5 \quad 34-6$$

$$39- \quad 39.6$$

2. Use aligned dimensioning method and redraw the diagram shown in Fig



$$\frac{40}{2} \quad \frac{45}{2}$$

$$20 \frac{1}{2} = 20^{\circ} 1.41$$

$$14.42$$

$$28.2$$

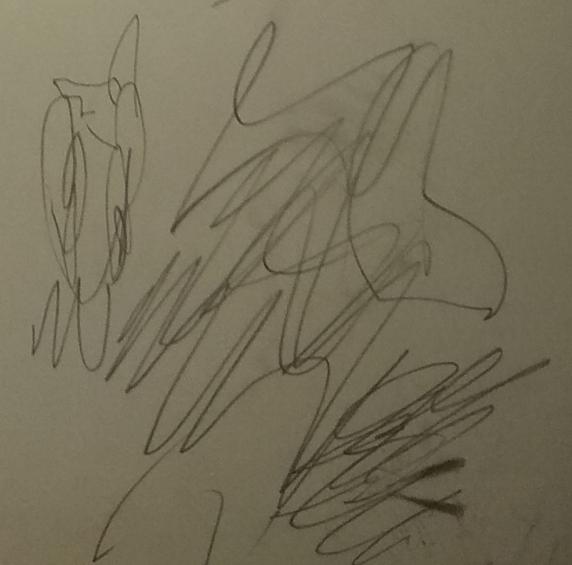
$$128.2$$

$$14.14$$

$$28.28$$

$$128.28$$

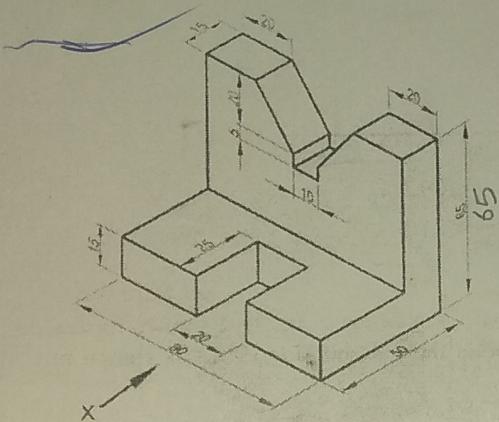
$$128.3$$



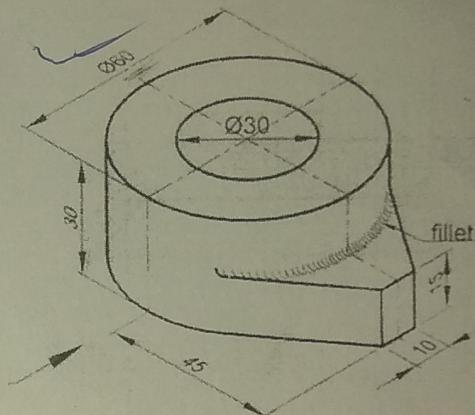
(15)

Home Work

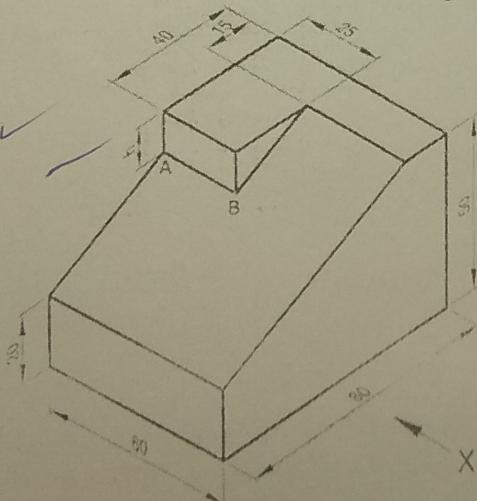
Using First angle projection Draw (a) Front view from X direction (b) Top view and (c) Side view of the given object:



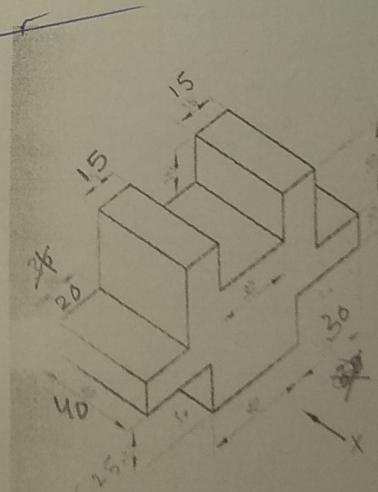
1.



2.



3.



4.

Home work

(1b)

Projection of points and lines

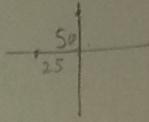
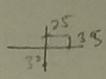
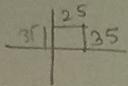
1. A line PQ 80 mm long has its end P 30 mm above HP and 15 mm in front of VP. Its top view (plan) has a length of 50 mm. Draw its projections when the line is kept parallel to VP and inclined to HP. Also find the inclination of the line with HP.
2. A line PQ has its end P 25 mm above HP and 15 mm in front of VP. Its plan has a length of 45 mm. The line is inclined at 45° to HP and parallel to VP. Draw its projections and find the true length of the line.
3. A line AB, 65 mm long, has its end A 20 mm above the H.P and 25 mm in front of the V.P. The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and shows its inclinations with the H.P. and the V.P.
4. A line EF 50 mm long is in VP and inclined to HP. The top view measures 30 mm. The end E is 10 mm above HP. Draw the projections of the line.

(16)

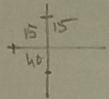
Class work

Projection of points and lines

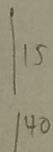
1. Draw the projections of the following points on a common reference line. Take 30 mm distance between the projectors.



A, 35 mm above HP and 25 mm in front of VP.



B, 40 mm below HP and 15 mm behind VP.



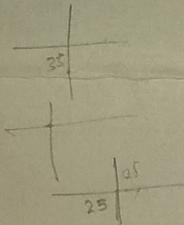
C, 50 mm above HP and 25 mm behind VP.



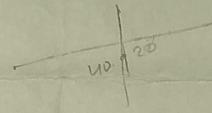
D, 45 mm below HP and 20 mm in front of VP.



E, 30 mm behind VP and on HP.



F, 35 mm below HP and on VP.



G, on both HP and VP.

H, 25 mm below HP and 25 mm in front of VP.

2. A line EF 40 mm long has its end E 20 mm above HP and 15 mm in front of VP. The line is inclined at 35° to VP and parallel to HP. Draw its projections.

3. A line AB, 50 mm long, has its end A in both the H.P. and the V.P. It is inclined at 30° to the H.P. and at 45° to the V.P. Draw its projects.

4. A 70 mm long line PQ, has an end P at 20 mm above the H.P. and 30 mm in front of the V.P. The line is inclined at 45° to the H.P. and 30° to the V.P. Draw its projections.

