

First sessional Test, PHYSICS

Time: 1 hour, M.M. 15

1. Define inertial frames. Write the postulates of relativity. 1
2. Write Galilean transformations. Deduce velocity transformations from them. 1
3. Do Galilean transformations satisfy relativity postulates? Explain by an example. 1
4. Write Lorentz transformations. Deduce Galilean transformations from them, in the nonrelativistic limit. 1
5. Write Einstein velocity transformations. Also write Einstein velocity addition (applicable to all three velocity components). Deduce Galilean velocity addition from them in the nonrelativistic range. 1
6. Do Einstein velocity transformations satisfy relativity postulates? Explain by an example. 1
7. An observer O' is moving, in the x direction with a velocity of $0.8 c$, w.r. to another observer O . An event happens w.r. to O at (x, y, z, t) and w.r. to O' at (a, b, k, t) . Given that $b = 2$ meter, $k = 4$ meter, $t = 1$ nano sec, calculate the values of x, y, z and a . Use Lorentz transformations. 2
8. Do the above problem, using Galilean transformations. Assume that $x = 2 a$ 1
9. Consider observers of Q 7. A particle is observed by O , to be moving in $x y$ plane, with a speed of $0.4c$, making an angle of 45 degrees with positive x axis. Use relativity to calculate all components of the particle's velocity, w.r. to both observers. 2
10. Do the above problem using Galilean velocity transformations. 1
11. Consider observers of Q 7. The observer O measures the speed of a radio wave beam to be c . The beam is travelling in vacuum and the observer O' finds that the x and y components of the beam velocity are $0.4 c$ and $0.3 c$ respectively. Use relativity to find all components of the beam velocity, w.r. to both observers. 2
12. Do the above problem, using Galilean velocity transformations. 1

DEPARTMENT OF APPLIED SCIENCES & HUM.

Faculty of Engg. & Tech., Jamia Millia Islamia

Applied Chemistry - II (AS-203)

First Sessional Test-2017 (B. Tech II Sem)

Time:-1 Hr. ☺

Note: Attempt the following questions.

Q 1 (a) A hard water sample was analyzed as follows.

$$\text{MgCO}_3 = 1.40 \text{ }^{\circ}\text{Fr}, \text{Ca}(\text{HCO}_3)_2 = 0.0123 \text{ gm/L}, \text{Mg}(\text{HCO}_3)_2 = 2.8 \text{ ppm}$$
$$\text{CaSO}_4 = 10.8 \text{ mg/L}, \text{MgSO}_4 = 0.40 \text{ }^{\circ}\text{Fr}, \text{MgCl}_2 = 12 \times 10^{-6} \text{ Kg/L},$$
$$\text{NaCl} = 5.85 \text{ ppm}.$$

Calculate Carbonate & non carbonate hardness of the given water sample in ppm.

(b)(I) (i) What are scales ? Discuss any four types of scales. How do they affect Boilers?

(II) Discuss phosphate conditioning of boiler feed water. Na₂PO₄ + CaO₂

(III) Define and Discuss the following terms

(a) Foaming (b) Carry over, (c) Steam purity

Q 2 (a) A coal sample has the following composition by mass.

$$\text{C} = 78 \%, \quad \text{H} = 10 \%, \quad \text{O} = 5 \%, \quad \text{S} = 4 \%, \quad \text{N} = 2 \%, \quad \text{and ash} = 1 \%. \quad (02)$$

Calculate (i) Minimum amount of air needed for complete combustion of 1 Kg of the given coal sample.

(iii) Percentage composition of flue gases by mass if 40 % excess of air is supplied.

(b) (i) Discuss the determination of Carbon, Hydrogen and Sulfur contents present in a coal sample using Ultimate analysis.

(iv) Define the terms 'octane number and cetane number'. What is unleaded petrol & why is it preferred over leaded petrol?

MM -30

(06)

(04)

(03)

(4)

(5)

First Sessional Test-2017-18
B.Tech. (Sec. A & B) 1st Semester
Innovative Technology & Bio-Science

Time : 1Hr.

M. M. : 15

Attempt all questions.

- | | | |
|-------------|---|-----------|
| Q. 1 | (a) What is Nanoscience and Nanotechnology? Define its interdisciplinary approaches in different sciences | 02 |
| | (b) What are the nanomaterials? How many types of nanomaterials on the bases of structures? | 02 |
| | (c) What is the quantum confinement effect? | 01 |
| Q. 2 | (a) What is graphene? Discuss its properties and applications. | 02 |
| | (b) Which properties of nanomaterials are changed at nanoscale and How? | 02 |
| | (c) What are the different methods of synthesis of Carbon Nano Tubes? | 02 |
| Q. 3 | Write explanatory notes on any two of following; | 04 |
| | (a) Green Nanotechnology | |
| | (b) Molecular Nanotechnology | |
| | (c) Bottom-up and Top-down Approaches | |

FIRST SESSIONAL EXAMINATION 2017-2018

B.TECH. I- SEMESTER

(COMMON PAPER FOR ALL BRANCHES: SECTION A and SECTION B)

BASICS OF ELECTRONICS AND COMM. ENGG (ECS – 201)

Duration: 1 Hour

M.M. 15

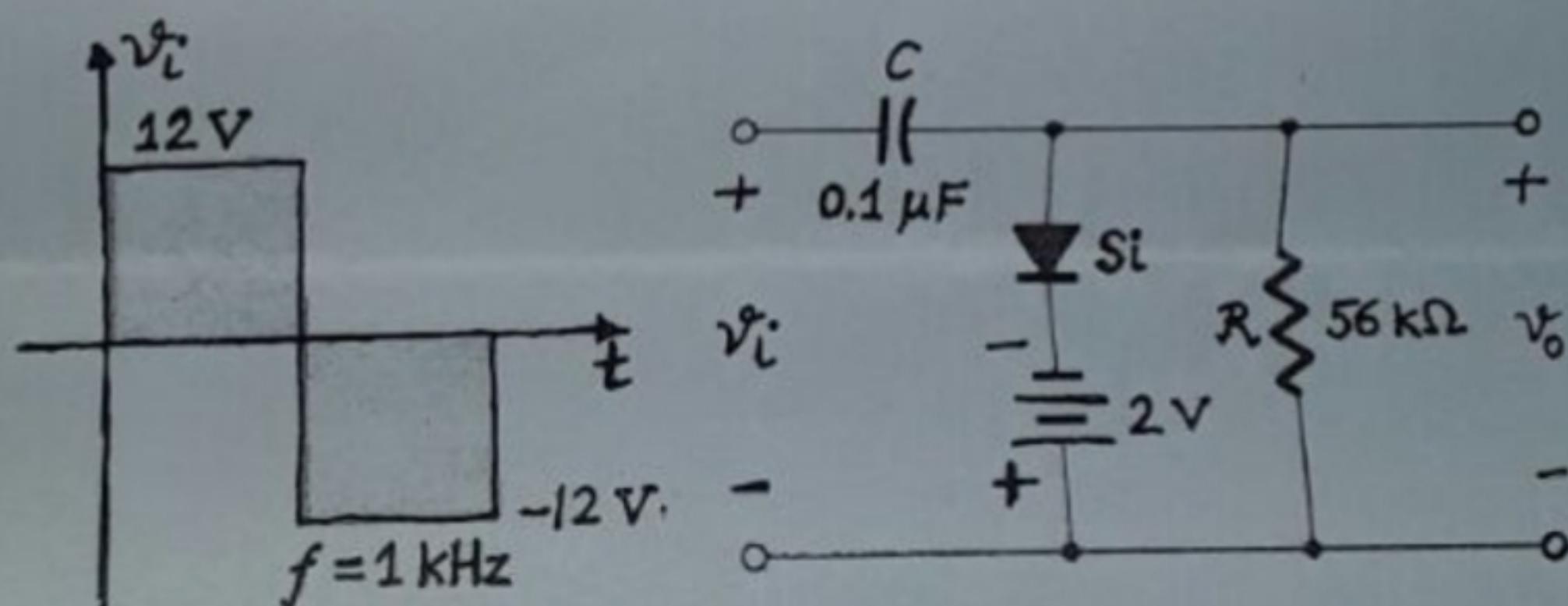
1. Attempt all the questions.

- Q.1.** Why Si diode is preferred over germanium diode. Explain the V-I characteristics of a PN junction diode when operated in forward biased and reverse biased mode. 3

OR

- Q.1'.** Explain in detail the operation and characteristics of a zener diode.

- Q.2** Determine the output voltage for the given network. 0
 a) For Ideal Diode
 b) For Silicon diode ($V_k = 0.7V$)



- Q.3.** What is a transistor? Explain the construction, working and characteristics of a bipolar junction transistor (BJT) in common base configuration.

- Q.4.** What do you understand by Early effect / Base width modulation effect? The reverse saturation current of an npn transistor in a common base circuit is $12.5 \mu A$. For an emitter current of $2 mA$, collector current is $1.97 mA$.
 Determine the current gain (α) and base current.

S

B-4G

Ist Sessional Test, 2013
B.Tech I Semester – Section 'C'
Basic Electronics (ECS – 201)

M.M:20

Q1) a) Explain the difference in conductors, insulators and semiconductors using the energy band diagrams. (3)

b) Draw the crystal structure of an N type and P type semiconductor. (2)

Q2) Explain how the process of avalanche breakdown occurs in a PN junction diode. How it is different from zener breakdown? (5)

Q3) Draw the circuit of a half wave rectifier and describe its working principle. Also obtain an expression for its efficiency and PIV. (5)

Q4) Explain the VI characteristics of a Zener diode. How it is being used in a voltage regulator circuit (5)

ECS-101

B.Tech. 2nd Semester Examination, 2017 (Common for all sections – C, D & E)
Basics of Electronics and Communication Engineering

Paper No. : ECS - 101

Time: 3 Hours

Maximum Marks : 45

(Write your Roll No. on the top immediately on receipt of this question paper.)

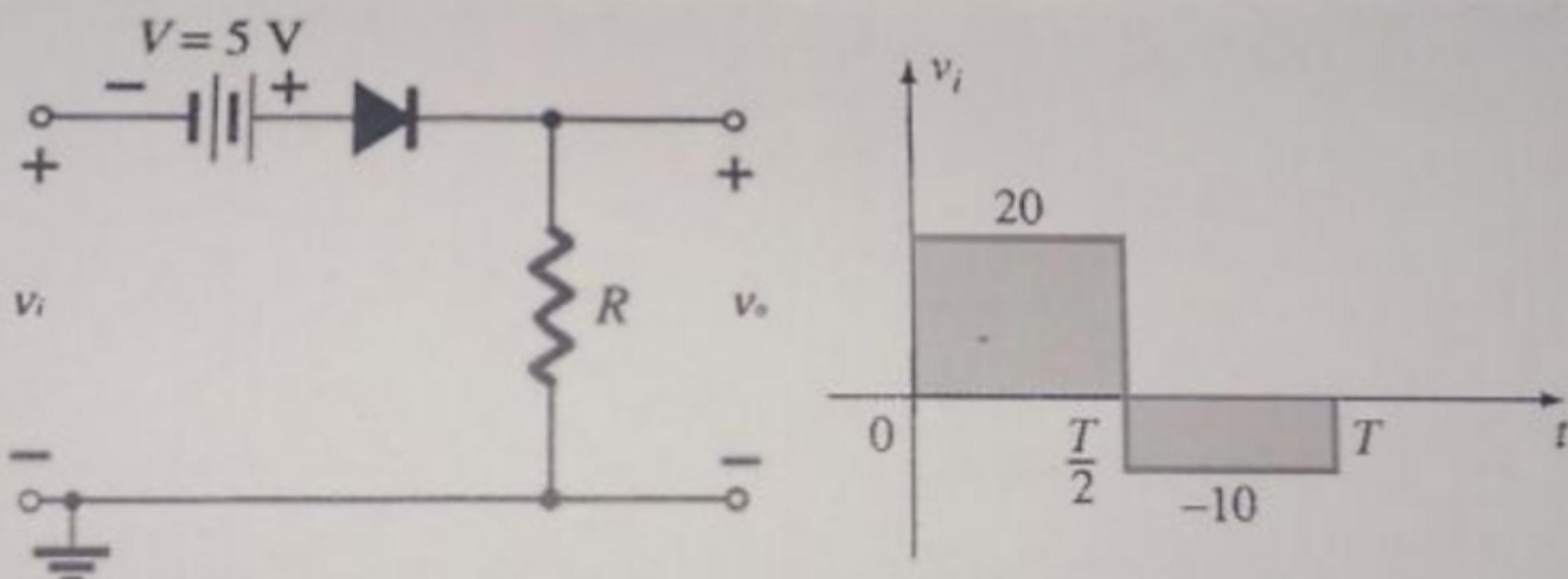
Note: Attempt any two parts in each question.

Any missing data may be suitably assumed.

Symbols and notations have their usual meanings.

1. (a) Explain the voltage-current characteristics of a p-n junction diode when operated in forward and reverse biased conditions and support your discussion with neatly labelled diagrams. (4.5)

- (b) Find the output voltage across the network shown in Figure 1(a) if the applied signal is a square wave as shown in Figure 1(b). (4.5)



- (c) State and explain the characteristics of a Zener diode. How it can be employed as a voltage regulator? (4.5)

2. (a) What do you mean by base-width modulation / Early effect? In a certain transistor, collector current is 0.98 mA and base current is 20 μ A. Determine the values of : a) Emitter current b) Current amplification factor (α) c) current gain factor (β) (4.5)

- (b) Draw the circuit of transistor in common emitter configuration. Explain the output characteristics clearly indicating active, saturation and cut-off region. (4.5)

- (c) Explain the working of n-channel JFET with the help of suitable diagrams along with its output characteristics. (4.5)

JAMIA MILLIA ISLAMIA
Department of Civil Engineering
B.Tech I Semester

(1)

First Sessional Test, Session: 2017-18

Paper Code: CE- 101 (Basics of Civil Engineering)

Time: 1 Hour

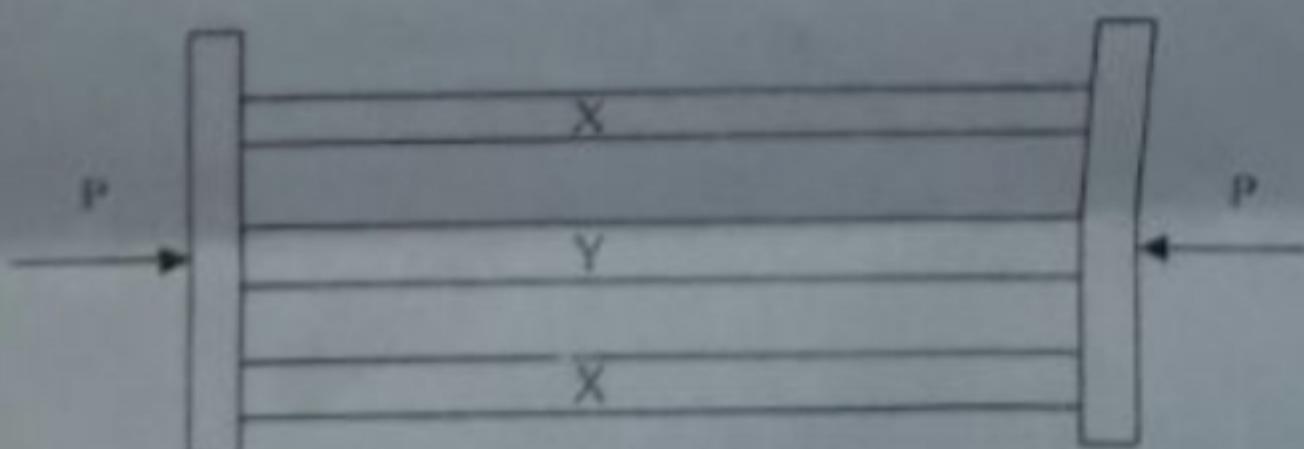
M.M. 15

Note: Attempt all questions. Assume suitable data, if missing.

Q1. Define the following terms: (05)

- a. Toughness and Hardness
- b. Elasticity and Plasticity
- c. Saint- Venant's Principle
- d. Creep
- e. Load Factor and Factor of Safety

Q2. Derive the expression for the change in length of a compound bar (shown in figure below) subjected to compression P. (05)



Q3. Two parallel walls, 6m apart, are joined together by a steel rod of 2.5 cm diameter at a temperature of 80°C passing through washers and nuts at each end. Calculate the pull exerted by the rod when it has been cooled to 22°C ,

- (a) if the walls do not yield, and
- (b) if the total yield together at the two ends is 1.5 mm.

Take $E = 200 \text{ GPa}$ and coefficient of thermal expansion = $11 \times 10^{-6} / {}^{\circ}\text{C}$. (05)

First Sessional

B.tech First Semester

Elements of Civil & Environmental Engineering (CE-101)

Time: 1 Hour

MM: 10

Q1. Draw stress strain curve for mild steel & describe each region with characteristic points. (2)

Q2. Define following properties of material (2)

i) Elasticity

ii) Creep

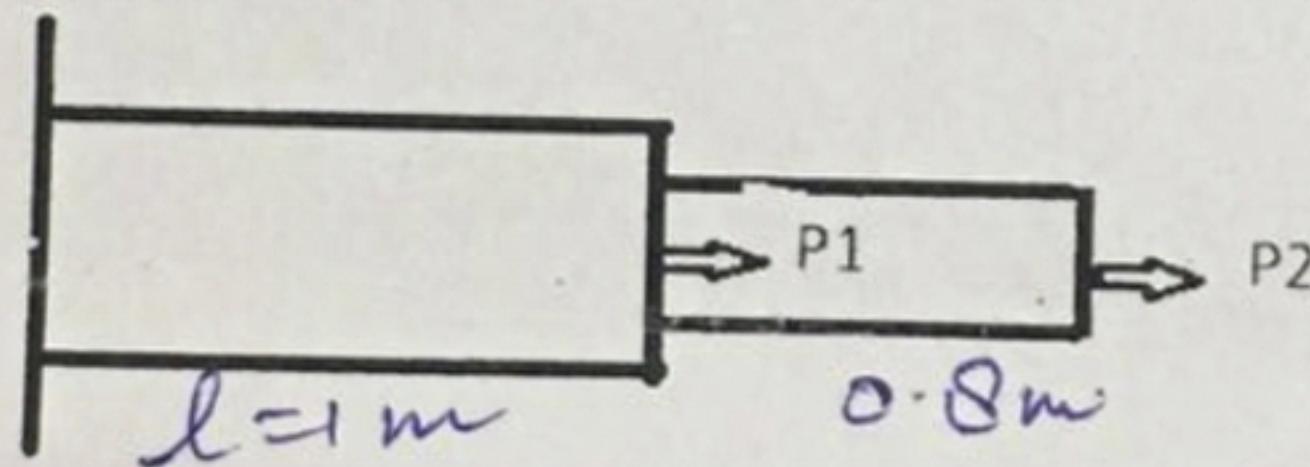
iii) Fatigue

iv) Modulus of resilience

A_1, P_1, l

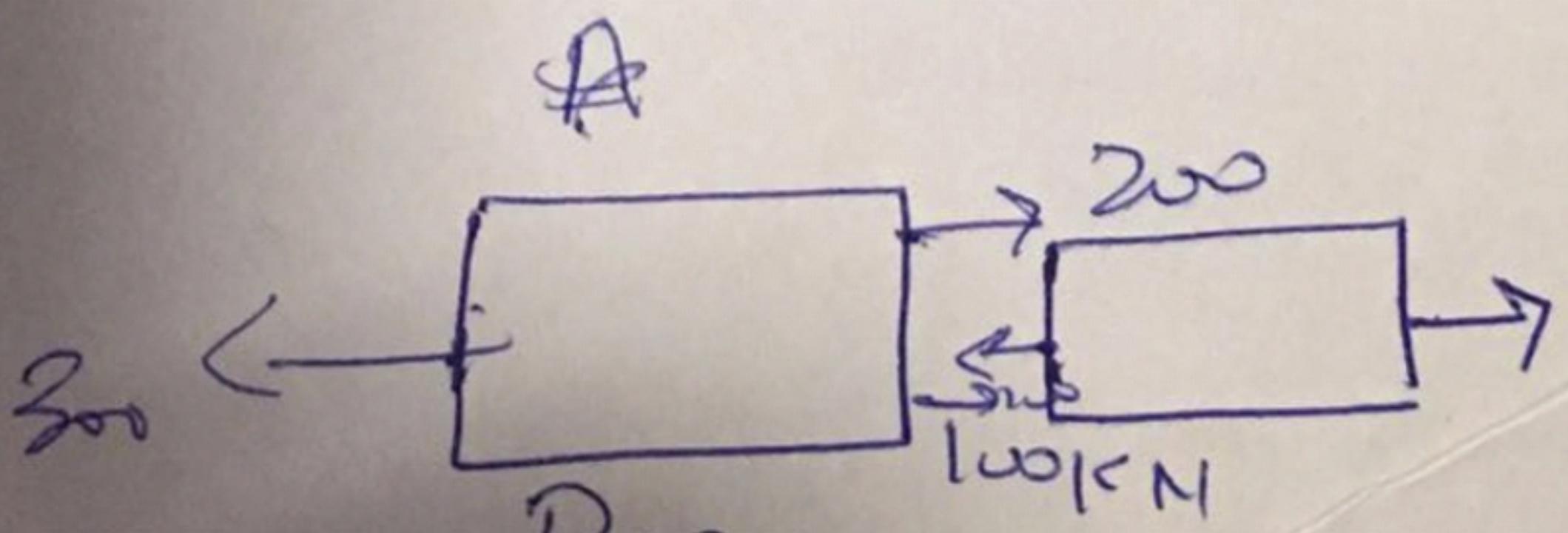
Q3. Derive an expression for extension in a rod under its self-weight. (3)

Q4. Find extension at end at which P_2 is applied. (3)



$$P_1 = 200 \text{ KN}, P_2 = 100 \text{ KN}$$

$$A_1 = 2000 \text{ mm}^2, A_2 = 1500 \text{ mm}^2, E = 2 \times 10^5 \text{ N/mm}^2.$$



B.Tech (First Semester) Section D, E, c

Basics of civil Engg (CE-101)

First Sessional

Time: 1 Hour

MM: 10

Q1. Explain the term (with graph) ✓

(a) Elasticity (b) Anelasticity (c) Toughness (d) Hardness (e) Relaxation 5

Q2. A Flat bar of Aluminium alloy 25 mm wide and 5 mm thick is placed between two steel bars each 25 mm wide and 10 mm thick to form a composite bar 25 mm \times 25 mm. The three bars are fastened together at their ends when the temperature is 15°C. Find the stress in each of the material when temperature of the whole assembly is raised to 55°C. Take $E_s = 200 \text{GN/m}^2$, $E_{al} = 66.67 \text{GN/m}^2$ and $\alpha_s = 1.2 \times 10^{-5}$ per °C, $\alpha_{al} = 2.3 \times 10^{-5}$ per °C. 5

OR

Q2' Derive the expression for the elongation in bar of uniformly tapering rectangular cross-section under load P.w acting at free end.



B.Tech {Section B/D/E}, 1st semester, 2nd Seasonal Examination, Oct, 2013

English Paper No: AS-101

Time: One Hour

Maximum Marks: 20

(Write your roll No. on the top immediately on receipt of the question paper)

Attempt Any Two Questions: (8X2=16 Marks)

1. Discuss how Spender deals nature in his poem *The Express*.
2. Discuss how Frost deals with the question of choice in his poem, *Road Not Taken*.
3. Discuss how J. P. Das' *Poetry* discusses the diminishing role of poem in contemporary world.

Write Meaning of Four Words: (1X4=4 Marks)

1. Locomotive
2. Idiosyncrasy
3. Convoluted
4. Amateur
5. Epistemology
6. Expatriate

Tech 1st Semester

Jamia Millia Islamia

First Sessional

Section A, B, & C

maximum Marks 15

English

Time: 1 Hour

1. Discuss how William Wordsworth, Stephen Spender and Robert Frost deal with Nature in their poems.
2. Critically analyse Lord Alfred Tennyson's Ulysses.

(5 Marks)

OR

Discuss how Lord Alfred Tennyson's Ulysses exposes the colonial mentality of English society of 19th century England.

(5 Marks)

3. Write a Report to the Head of the Department of Applied Sciences & Humanities stating the survey conducted by a group of students of your class of Jamia Engineering Faculty Canteen and talk about your findings about its condition, physical structure, food quality, working condition, serving quality, etc.

(2 Marks)

4. Fill in the Blanks with suitable Verb:

- A. George and Tamara..... want to see that movie. (Don't, Doesn't)
- B. One of my sisters going on a trip to France. (Are, Am, Is)
- C. The movie, including all the previews, about two hours to watch. (Taken, Takes, Talk)
- D. Mathematics..... John's favourite subject. while Civics is Andrea's favourite subject. (Are, Am, Is)



Department of Applied Sciences & Humanities
First Mid-Term Examination
Communication Skills .. AS- 101

FM 15; Time 1 Hrs

Note: Read the questions carefully and avoid circumlocution in your answers.
All the questions carry equal marks (the word limit of Q1 to Q3 is 200 words)

- Q1. Please discuss the idea of Success as inferred in the poem, *Amalkanti* from the perspective of the persona and offer your comments justifying or refuting such concept.
- Q2. *Of Studies* as a literary text touches upon various facets of the idea of knowledge and its utility in personal and public platform. Discuss the statement with reference to the text.
- Q3. Contextualise the essence of the poem, *Where is Mind Without Fear* in the world that you live in
- Q4. Correct the following sentences if there is any grammatical error.
- The public authority and a group of scholar have eventually arrived at some agreements after a lengthy round of discussions.
 - How foolishly he behaved with his fellow passengers! He probably was in airs as if he was the owner of the Transport Department.
 - The cost of essential commodities, small electronic gadgets and home appliances have seen a steep rise in the recent past.
- Q5. Use the following words in sentences in a way that their meanings get explicated.
- Transcend
 - Unclogged
 - Chasm

B. TECH. II SEMESTER (ALL SECTIONS)

ENGINEERING MATHEMATICS - II (AS - 204) COMMON PAPER

FIRST SESSIONAL TEST 2016-17

MAXIMUM MARKS: 15 TIMES: 2:00 P.M. - 3:00 P.M.

DATE: 06/03/2017

Attempt any five questions. All question carry equal marks.

- Q-1. Prove that the function $f(z)$ defined by: $f(z) = \frac{x^3(1-i) - y^3(1-i)}{x^2 + y^2}$, $z \neq 0, f(0) = 0$ is continuous and the Cauchy-Riemann equations are satisfied at the origin but is not analytic at the origin.
- Q-2. If $f(z) = u + iv$ is an analytic functions such that $u(x, y) = e^{-2xy} \sin(x^2 - y^2)$ then find harmonic conjugate $v(x, y)$.
- Q-3. Find the value of $J_{\nu}(x)$ and $J_{-\nu}(x)$ in term of $\sin x$ and $\cos x$ respectively. Hence find the value of $J_{5/2}(x)$ in term of $J_{\nu}(x)$ and $J_{-\nu}(x)$.
- Q-4. Evaluate $\iint_0^{\infty} e^{-(x^2+y^2)} dx dy$ by changing into polar coordinates. Hence find the value of $\int_0^{\infty} e^{-x^2} dx$.
- Q-5. Find the volume bounded by the cylinder $x^2 + y^2 = 4$ and the planes $y + z = 0$.
- Q-6. Show that: $J_0(x) = \frac{1}{\pi} \int_0^{\pi} \cos(x \cos \varphi) d\varphi$.

Q-1

$$\sqrt[n+1]{n+1} \sqrt[n+1]{n+1} \\ (\underbrace{n+2}_{n+1}) > \underbrace{(n+2)}_{n+1} > (n+1) \sqrt[n+1]{n+1}$$

B.Tech II Semester (All sections)

Engineering Mathematics-II (AS-204) Common Paper

SECOND SESSIONAL TEST 2016-2017

DATE: 17/04/2017

Maximum Marks: 15 TIME: 2:00 P.M - 3:00 P.M

NOTE: Attempt any five questions. All questions carry equal marks.

Q.NO:1. Evaluate: $\oint_C \frac{z-3}{z^2+2z+5} dz$, where C is the circle

(a). $|z|=1$, (b) $|z+1-i|=2$, (c) $|z+1+i|=2$.

Q.NO:2. Find the Laplace Transform of:

$$(a). f(t) = t^2 \sin 3t \quad (b). f(t) = \frac{(2-e^{3t})}{t}$$

$$Q.NO:3. \text{ Express: } f(x) = \begin{cases} 0, & -1 < x \leq 0 \\ x, & 0 < x < 1 \end{cases}$$

in terms of Fourier Legendre expansion (upto 4 terms).

Q.NO:4. Prove that: (a). $P_{2n}(0) = (-1)^n \cdot \frac{(2n)!}{2^{2n} \cdot (n!)^2}$

$$(b). P_n'(1) = \frac{1}{2} n(n+1)$$

Q.NO:5. Compute the moment of inertia of a right circular cylinder of altitude $2h$ and radius b , relative to the diameter of its median section with density equal to K , a constant.

$$Q.NO:6. \text{ Prove that: } \beta(p, q) = \int_0^\infty \frac{y^{q-1}}{(1+y)^{p+q}} dy = \int_0^1 \frac{x^{p-1} + x^{q-1}}{(1+x)^{p+q}} dx$$

$$\frac{e^x - e^{-x}}{2}$$

$$\frac{e^{ix} - e^{-ix}}{2}$$

$$\frac{q^3}{16} \times \frac{\pi}{4\pi b} =$$

Subject: Engg. Mathematics-II (New)

Title: Engineering Mathematics-II

Time : 3 hours

Maximum Marks: 60

Note: Attempt all questions. All questions carry equal marks. Choices, if any, is given in the question itself. Scientific calculator is allowed.

Q1. Solve any two parts:-

(a). Change the order of integration and hence evaluate

$$I = \int_0^a \int_{\sqrt{ax}}^a \frac{y^2 dx dy}{\sqrt{(y^4 - a^2 x^2)}}$$

(b). Find the M.I of the area bounded by the curve $r^2 = a^2 \cos 2\theta$ about its axis.(c). Evaluate $\iint_R (x+y)^2 dx dy$, where R is the parallelogram in the xy-plane with vertices (1,0), (3,1), (2,2), (0,1) using the transformation $u = x+y$ and $v = x-2y$.(d). Evaluate $\iint_R (x+y)^2 dx dy$, where R is the parallelogram in the xy-plane with vertices (1,0), (3,1), (2,2), (0,1) using the transformation $u = x+y$ and $v = x-2y$.

Q2. Solve all parts :

(a). Solve in series the equation $9x(1-x) \frac{d^2y}{dx^2} + 12 \frac{dy}{dx} + 4y = 0$.(b). Solve $(mz - ny) \frac{\partial z}{\partial x} + (nx - lz) \frac{\partial y}{\partial y} = ly - mx$. OR(c). Solve $2xz - px^2 - 2qxy + pq = 0$.

(vii)

Q3. Solve any two parts :-

(a). If $f(z)$ is a regular function of z , prove that

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4|f'(z)|^2.$$

(b). Evaluate $\oint_C \frac{z^3}{(z-1)^3(z-2)(z-3)} dz$, Where C is the circle $|z| = 4$ (c). Show that $\int_0^{2\pi} \frac{\cos 2\theta d\theta}{1-2a\cos\theta+a^2} = \frac{2\pi a^2}{1-a^2}$, ($a^2 < 1$).

Q4. Solve any two parts:-

(a). Find the Laplace transform of $\frac{\cos at - \cos bt}{t} + t \sin at$.(b). Apply Convolution theorem to evaluate $L^{-1} \left\{ \frac{s}{(s^2+1)(s^2+9)(s^2+16)} \right\}$.

(c). Solve $(D^3 - 3D^2 + 3D - 1)y = t^2 e^t$ given that $y(0) = 1, y'(0) = 0, y''(0) = -2$.

Q5. Solve any two parts:-

(a). Show that $f_n(x) = \frac{1}{\pi} \int_0^\pi \cos(n\theta - x \sin\theta) d\theta$, n being an integer.

(b). Express $f(x) = x^4 + 3x^3 - x^2 + 5x - 2$ in terms of Legendre polynomials.

(c). Test the given series for convergence:

$$\frac{1}{2\sqrt{1}} + \frac{x^2}{3\sqrt{2}} + \frac{x^4}{4\sqrt{3}} + \frac{x^6}{5\sqrt{4}} + \dots \infty$$