

Max. Marks 15

Time: 1 hr.

Note: Attempt all questions. Assume suitable data if not given.

- Q.1a** Define the terms elasticity and work hardening. (3)
- Q.1b** A tension test is conducted on a steel rod of gauge length 55 mm and diameter 10 mm. The rod during the test elongates to 80 mm. A maximum load of 80 kN may be applied on the rod but it yields at 35 kN and finally breaks at 40 kN. Find the following parameters.
- (a) Yield Strength
 - (b) Ultimate Strength
 - (c) Strength at the time of failure
 - (d) Actual strength at the point of failure when the diameter is reduced to 5 mm
 - (e) Percentage elongation
 - (f) Percentage reduction in area. (5)
- Q.2** A mild steel rod of 10 cm diameter has a thin brass sleeve (9.99 cm internal diameter and 3 mm thickness) shrunk over it. If E and α for Brass are 10^6 kg/cm^2 and $2.02 \times 10^{-5} / ^\circ\text{C}$ and the room temperature is taken as 10°C , determine:
- (a) Temperature to which the sleeve must be heated so that it attains the diameter of the rod.
 - (b) Pressure developed between the rod and sleeve, when both cool to room temperature, assuming the steel rod as rigid.
 - (c) The axial force necessary to separate the two at room temperature, if the coefficient of friction is 0.2 and the overlap of sleeve and rod is 10 cm.
 - (d) Same as (b) and (c), if the temperature is raised to 20°C and α for steel is $1.17 \times 10^{-5} / ^\circ\text{C}$.
 - (e) The temperature at which the sleeve shall easily come off. (7)

Sessional Test-I
Engineering Physics
B.Tech. Sem-II

Roll No....

Time: 1 hour

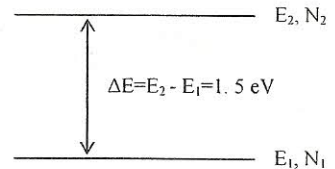
M.M. 15

1. The energy levels in H-atom are given by

$$E_n = -\frac{13.6}{n^2} \text{ (in eV)}$$

Assume that H atoms obey Maxwell Boltzmann distribution. Let the ground state population (at $T=10^3$ Kelvin) be 5×10^{22} . Calculate the populations of next three levels ($n=2, 3, 4$) at the same temperature.

2. Consider a two level system with levels separated by 1.5 eV. At temperature T_1 the population $N_2 = 0.1N_1$. Calculate T_1 . To raise the population N_2 by 10%; how much should be the percent rise in temperature? Note that $(N_1 + N_2)$ does not change as the temperature is raised.



3. Let the Maxwell Boltzmann distribution

$$N = A e^{-\frac{E}{k_B T}}$$

be approximated by

$$N = A \left(1 - \frac{E}{k_B T} \right)$$

Does this approximation make sense for low temperature or for high temperature? Using this approximation at $T=10^6$ Kelvin, find the energy E such that this approximation differs from the exact expression by not more than 1 percent.

4. What are Einstein's coefficients? Obtain a relation between them.
5. The active medium in a particular laser that generates laser light at a wavelength of 633 nm is 10.0 cm long and 0.4 cm in diameter. Treat the medium as an optical resonance cavity. How many standing wave nodes are there along the laser axis? What should be the shift $\Delta \nu$ in beam frequency to increase this number by one? The index of refraction of the lasing medium is 1.65.
6. What is the connection between population inversion and negative temperature? Explain. If the negative temperature of a two level system is -500 Kelvin, what does it imply for the ratio of populations of the two levels.

B.Tech. (Ist year) II Semester Examinations
Sessional – II
Mech. Engg. Jamia Millia Islamia
FOC

Time: 1 hrs.

Max.Marks: 12

Notes: Attempt All Questions

Q 1.	Draw a functional Block diagram of Computer & Explain it in details.?	3
Q 2.	<p>What do you understand by Flow chart?. Define algorithm and its properties?</p> <p style="text-align: center;">Or</p> <p>Convert the following:</p> <p>d. $(AB.CD)_{16} = ()_2$</p> <p>e. $(1101010101)_2 = ()_{16}, ()_8$</p> <p>f. $(25.50)_{10} = ()_2, ()_{16}$</p>	3
Q 3.	<p>Explain any two from following :</p> <p>d. Super Computer</p> <p>e. Micro Computer</p> <p>f. Generation of computers</p>	3
Q 4.	<p>What do you understand by RAM, PRAM and PROM.</p> <p style="text-align: center;">Or</p> <p>Write a program in C to take a number (3 digit only) as input and give the sum of its digit as output.</p> <p style="text-align: center;">Or</p> <p>Write a program in C to check whether a number (3 digit only) entered by a user is palindrome or not.</p>	3

DEPARTMENT OF APPLIED SCIENCES & HUM.

Faculty of Engg. & Tech. JMI

Applied Chemistry –II First Sessional Test (B. Tech II Sem)

Time:-1 Hrs.

MM -30

Attempt the following questions.

- Q 1 (a) A hard water sample was analyzed as follows. (07)
 $\text{MgCO}_3 = 0.42^\circ\text{F}$, $\text{Ca (HCO}_3)_2 = 0.0648 \text{ gm/L}$, $\text{Mg(HCO}_3)_2 = 43.8 \text{ ppm}$
 $\text{CaSO}_4 = 40.8 \text{ mg/L}$, $\text{MgSO}_4 = 8.40^\circ\text{F}$, $\text{MgCl}_2 = 57 \times 10^{-6} \text{ Kg/L}$
Calculate Temp. and Permanent hardness of the given water sample.
- (b) Discuss the following.
- (i) Carbonate and non-carbonate hardness of water. (02)
 - (II) Sludge formation in boilers. (03)
 - (III) Scale formation in boilers. (03)
- Q 2 (a) A coal sample has the following composition by mass.
 $\text{C} = 80\%$, $\text{H} = 8\%$, $\text{O} = 6\%$, $\text{S} = 2\%$, $\text{N}_2 = 2\%$, and the rest is ash.
Calculate (i) Minimum amount of air needed for complete combustic of 1 Kg
of the given coal sample. (ii) Percentage composition of flue gases if
20 % excess of air is supplied. (08)
- (b) (i) Determination of calorific value of a solid fuel by Bomb Calorimeter.
Discuss the corrections required. (03)
- (ii) Discuss the determination of carbon and Nitrogen contents present in a
coal sample ((ultimate analyses). (04)

1st Sessional Test

Basics of Electronics and Communication Engg.

B.Tech (Mechanical – IInd Semester)

Max. Marks: 20

- Q1. (a) Explain V-I characteristics of a PN junction diode. (5)
- Q1. (b) What do you understand by Static and Dynamic Resistance of a diode? (5)
- Q2. Explain half wave rectifiers and full wave bridge rectifiers in detail. (10)

SESSIONAL TEST-I.

B.Tech (Mech.) IIND. SEMESTER - 2012.

SUBJECT- THERMODYNAMICS (ME-201).

TIME ALLOWED - 1 hour.

MAX. MARKS- 15

NOTE - Write answer to all questions.

Questions -

- Differentiate between macroscopic and microscopic points of views of thermodynamics.
- Explain the difference between extensive and intensive properties of a system with examples.
- Prove that Work is a path function.
- Show that the work done per kilogram of a perfect gas during an adiabatic expansion for which $pV^\gamma = \text{const.}$ is given by

$$W_{1-2} = \frac{p_1 V_1 - p_2 V_2}{\gamma - 1}$$

- In a centrifugal compressor, the suction and delivery pressures are 100 kPa and 550 kPa respectively. The compressor draws $15 \text{ m}^3/\text{min}$ of air which has a specific volume of $0.77 \text{ m}^3/\text{kg}$. At delivery point, the specific volume is $0.20 \text{ m}^3/\text{kg}$. The compressor is driven by a 40 kW motor and during passage of air through the compressor, the heat lost to the surroundings is 30 kJ/kg of air. Neglecting changes in the potential and kinetic energy, make calculations for increase in internal energy per kg of air.

Department of Applied Sciences and Humanities

Sessional Test: 1

English

Maximum Marks: 15

Time: 1 Hour

Note: Each question carries equal marks.

Q1. Attempt a Précis of the following passage:

The first thing that strikes the critical minority, as it looks at the whole cultural picture, is that ours is a nation of new-rich people, well washed, all dressed up, rather pathetically unsure just what it is washed and dressed up for; a nation convinced that a multitude of material goods, standardized, furiously and expensively advertised by appeals to greed and vanity, will in themselves make life worth the living. Because we are new-rich, we overvalue possessions. Almost any individual who makes a great deal of money very rapidly supposes that mere possession of wealth is evidence of worth. He also is apt to imagine that with his means he can buy happiness. These mistakes usually seem folly to the old-rich, to one who was born to poverty, whose father and mother were bred with it. Such a one knows that merely because he or his friends have it, it is no sign that they are worth it, but quite commonly the contrary. He has learned through experience that money is not in itself very valuable stuff. Happiness, which is what all men desire, cannot be purchased; it is an elusive something not for sale. The old-rich know these things well enough, but the new-rich rarely discover them until they have grown accustomed to possessions. So it seems to be with our society. We go in, almost without question and in all classes, for the sordid nonsense of supposing that externalities possessed ennoble the owners, that a full fist invariable indicates a fine spirit.

Q.2. Define reports. What are the different parts of a manuscript report. Explain each one of them.

Q.3. Write a letter to the customer care team complaining that the product you had ordered online was delivered late and you also found out that it was used and damaged. Request them to enquire and make amendments.

Or

Q.3. Write an argumentative essay discussing the importance of zoos and why people and government should support them.



Dept. of App. Sciences & Hum., F/O Engg. & Technology, JMI.

Engineering Mathematics-2 First Sessional Test , Semester-2, 2012

Date: 13-02-2012(Monday) Time 2.15pm - 3.15 pm , MM: 09

NOTE: Solve three questions selecting one question from each section. Scientific calculator is allowed. Write your full roll number on each answer book & attach it properly.

SECTION-A

1(a). Find the equation of the cone with vertex $(1, 1, 1)$ and which pass through the curve given by $x^2 + y^2 = 4$, $z = 2$.

1(b). Solve $p - q = \ln(x + y)$, by Lagrange's method OR

Solve $x^2 p + y^2 q = (x + y)z$, by Lagrange's Method

2(a). Find the equation of right circular cylinder of radius 2 and whose axis is the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{2}$.

2(b). Solve $6yz - 6pxy - 3qy^2 + pq = 0$, by Charpit's method.

SECTION-B

3(a). Evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx$.

3(b). Solve $\frac{d}{dx} [x^5 J_5(x)]$

4(a). Solve $\frac{d}{dx} [x^{-6} J_6(x)]$

4(b). Evaluate $\iint r \sin \theta dr d\theta$ over the area of the Cardioid $r = a(1 + \cos \theta)$ above the initial line.

SECTION-C

5. Solve: $2x^2 \frac{d^2 y}{dx^2} + (2x^2 - x) \frac{dy}{dx} + y = 0$.

6. Solve: $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + (x^2 - 4)y = 0$.

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NOTE.1. Both sessional tests are compulsory & are of 9 marks each.

2. Evaluation of class notes & detailed solution of home works -12 marks

3. Plan for evaluation of sessional tests answer sheets, class notes/home works.

Date	Day	Time	Branch	Time	Branch
14 th April, 2012	Saturday	9-12:30	Mechanical, Electrical	1 -4:30	E & C, Computer
15 th April, 2012	Sunday	9-12:30	Civil		
16 th April, 2012	Monday	Girls from all branches in their respective Maths Classes			