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Mid Semester Examination 2013-2014
CE 111 Environmental studies

Note : Attempt all question

Maxm Marks : 25 Time : 1 Hour

1. Distinguish between biotic and abiotic components of an ecosystem. Enlist 4 the various biotic and abiotic components of pond ecosystem.

OR

- 1' Draw the flow diagram of energy cycle and discuss the flow of energy in an ecosystem. 4

heat
wind

2. What is ecology? Mention the basic concepts of ecology? 4

pressure
moisture

- ✓ 3. What is meteorological phenomenon and explain its all variables in brief. 4

4. Define different lapse rates and discuss their relationship with atmospheric stability. 4

OR

- 4'. Explain in detail all plume behaviour in terms of lapse rates and dispersion. 4

5. Draw the water treatment scheme for surface water. Briefly explain the purpose of each unit. 4

6. What are different water quality parameters? 3

7. What are persistent organic pollutants in environment? 2

↓
Aldrin, dieldrin

⑨

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2013-2014

Mid Semester Examination
I Year B. Tech. (Autumn Semester)
Applied Physics (AP111)

$$eV_0 = h\nu - h\nu_d (\mu n - \frac{e}{m})$$

$$eV_0 = h(\nu - \frac{\nu_d}{n})$$

$$\hbar\nu = h\nu_0 - eV$$

M.M. 25

$$V = \frac{e}{h} \frac{\epsilon}{n}$$

Duration: 1 Hour

Answer both questions. Symbols have their usual meanings.

- 2πε₀*
- 1(a) Define the terms; induced absorption, spontaneous emission and stimulated emission. Write down Einstein's equations for transition rates corresponding to these terms. What inference can be drawn from these equations? 5.0
- (b) Discuss the principle and working of ammonia maser. Also mention its one important application. 5.0

OR

- (b) What is the basic principle of optical fiber communication? Obtain an expression for angle of acceptance in case of an optical fiber. 5.0
- (c) The core and cladding of silica fiber have refractive indices 1.5 and 1.44 respectively. Calculate angle of acceptance and numerical aperture of the optical fiber. 2.5
- 2 (a) Explain the mechanism of Characteristics x-ray production. Find the maximum frequency present in the radiation from an x-ray machine whose accelerating potential is 55 kV. 3.5
- (b) What is pair production? Show that it cannot occur in empty space. An x-ray photon whose initial frequency was 1.5×10^{19} Hz emerges from a collision with an electron with a frequency of 1.2×10^{19} Hz. How much kinetic energy was imparted to the electron? (Given: $h=6.63 \times 10^{-34}$ J.s) 3.0
- (c) What are the characteristics of a well behaved wave function? Show that the energy of a trapped particle in one dimensional box is quantized. 6.0

~~Answer any two questions and neglect the weights of the other questions~~

Mid Semester B. Tech/B. Arch Examination
(Autumn Semester, 2013 – 2014)
Applied Mechanics ME – 111

Max. Marks: 25

Time: 1 Hour

Note: Assume suitable data if necessary,

Attempt any two questions from Section A,

Attempt all questions from Section B

SECTION A

Q1. A container of weight $W = 1165 \text{ N}$ is supported by three cables as shown in Fig. 1. Determine the tension in each cable. 7.5

Q2. Two transmission belts pass over sheaves welded to an axle supported by bearings at B and D (refer Fig. 2). Sheave at A has a radius of 50 mm, and the sheave at C has a radius of 40 mm. Knowing that the system rotates at a constant rate, determine (a) the tension T , (b) the reactions at B and D. Assume that the bearing at D does not exert any axial thrust and neglect the weights of the sheaves and axle. 7.5

Q3. The cylinder shown in Fig. 3 is of weight W and radius r , and the coefficient of static friction μ_s is the same at A and B. Determine the magnitude of the largest couple M which can be applied to the cylinder if it is not to rotate. 7.5

SECTION B

Q1. (a) Which of the following is correct? 0.5

- (i) $E = 3N(1+1/m)$
- (ii) $E = 3k(1-2/m)$

Q1. (b) Write the equation of load and equation of compatibility only for the composite sections given in Fig. 4 and Fig. 5 with the following data:

$A_{cu1} = A_{cu2} = 2A_s$; $\alpha_{cu} > \alpha_s$; $E_s > E_{cu}$ and the temperature is increased. 2

Q1. (c) Write $\Sigma \in_v$ for a cube of side 'a' with loads P_1 , P_2 and P_3 all tensile in x, y and z directions respectively, applied at the three mutually perpendicular faces of the cube. 1

Q1. (d) Draw the free body diagrams only of Fig. 6. 0.5

Q1. (e) Write laws of SF and BM. 1

ydt

Q2. Determine σ_s and σ_{cu} for Fig. 4 OR Fig. 5, if $P_t = 6000N$, $A_{cu1} = A_{cu2} = 1200mm^2$, $A_s = 600mm^2$, $E_s = 2E_{cu} = 2 \times 10^5 N/mm^2$, $a_s = (1/2)a_{cu} = 6 \times 10^{-6}/^\circ C$. Increase in temperature = $30^\circ C$.

5

OR

Q2'. Determine SF and BM and draw SFD and BMD for the structure shown in Fig. 7. 5

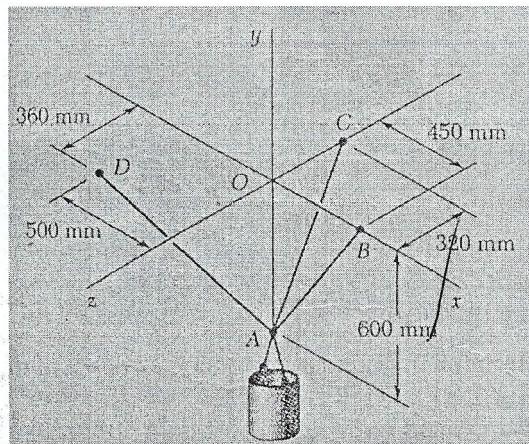


Fig. 1

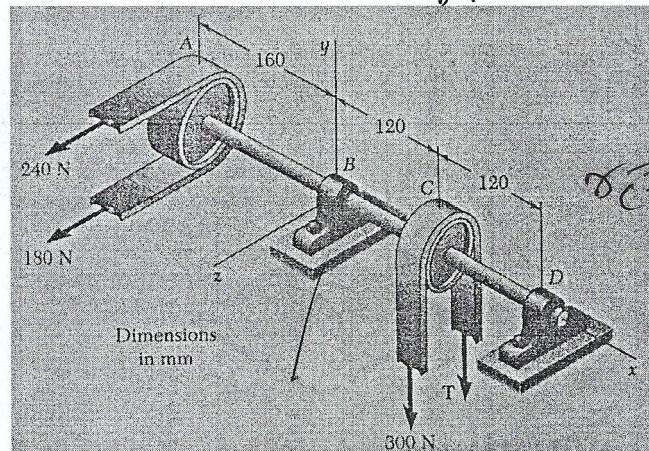


Fig. 2

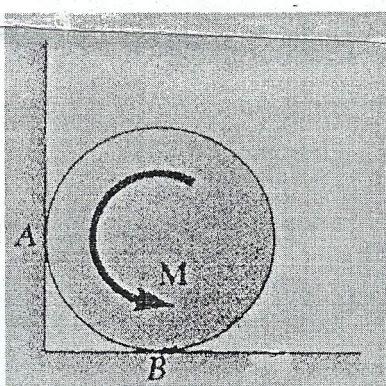


Fig. 3

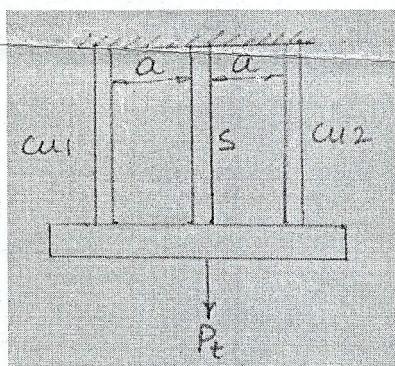


Fig. 4

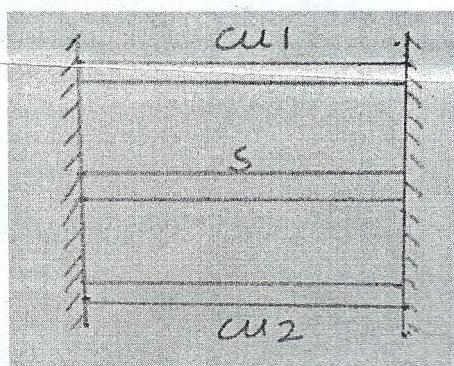


Fig. 5

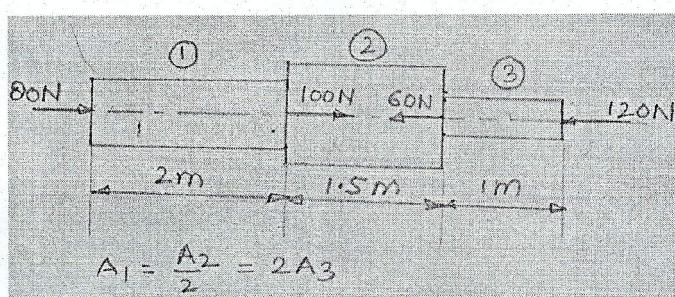


Fig. 6

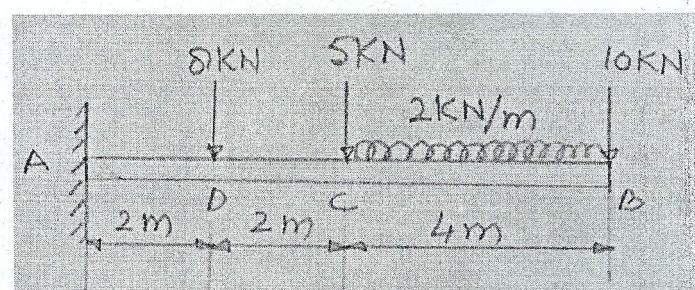


Fig. 7

Evolution of Science & its consequences

Mid-Semester Examination

B.Tech First Year (2013-2014)

English (EN-101)

Time: one hour

MM: 25

Q.1 Read the following passage carefully. Make notes and write précis of the same. (10)

The question of creativity is one of the fundamental preoccupations of science and technology for the evolution of life and progress of societies. The development of modern technology particularly in the last two hundred years has ushered in unprecedented transformations in almost all the spheres of the social condition of man. Invention is possible on two lines: the first consists of making something possible out of nothing and the second consists of making something by starting from something. The former is the realm of science which requires imagination and reason, the latter is the domain of technology which is contingent upon matter. The distinction seems more schematic and less practical and leads to unification rather than bifurcation when one takes into account the necessity and nature of interaction between mind and matter. The conception of material reality is the function of man's sensory experience of his surroundings. Thus the operation of imagination in science in providing a design or theory is not as magical as it seems to be. It demands actual interaction with the physical universe, because human mind can comprehend a phenomenon only after the senses have furnished an impression of it.

Man's obsession with creation or invention is very old. A genuine invention is one which not only brings some fundamental change to the basic condition of life but is essential for the social survival of man such as, agriculture, architecture and some essential handicrafts. Before the advent of the modern science, when technical education and transmission of skills were confined within families, man had invented everything essential for his life. Though it is difficult to imagine the rapid development of science over the last two centuries without the establishment of universities, such institutions do not alone explain the progress sufficiently in the same way as, for instance, nobody can question the contribution of the development in optics and radiology and other technical apparatuses to the improvement in modern surgery but the role of recurrent wars provides better explanation for the surgical refinement. Over the last few centuries man has invented less things which are essential to life - except in the field of medicine, but the progress has no more contained the proliferation of diseases - and perpetuated more the repetition and preservation of the achievements of the past.

There have been many suggestions in recent times to reform the education system to ensure invention and innovation without much consideration for creating the condition for the stimulation of mind. Growth of complex mental structures seems to depend on the engagement with certain functions. These structures are of formal nature and remain empty and inoperative if they are not grounded on a store of acquired knowledge. Insight gained from neurology has revealed that during initial period of childhood children's cerebral structures remain extremely elastic, but their future development and maturity depend on the nature of their operation. When some new-born rabbits are isolated in an empty cage and in a cage filled with toys with which they struggle, a subsequent autopsy of their brains reveals that their neurological development is so different. The nervous projections that connect neurons have become more complex in the second group than in the first one.

The atrophy of creativity explains the drama of the development of our civilisation which has resulted into a paedagogical crisis. Children are born and grow up in a world of our own making, a world which anticipates their needs and overwhelms them with solutions. In this respect, one sees no difference between the industrial products that inundate the markets and the surplus supply of books which dull the taste and discourage efforts. The fact is that in this world of ease and waste university campus remains probably the only place where one has to take pains, submit to discipline, suffer frustration, progress step by step and live a hard life. Young students do not accept this situation because they no longer understand it. They suffer demoralisation and constraints for which neither the family nor the society has prepared them.

Q.2 Write an essay in about 300 words on any **one** of the following. (10)

- a) If information ~~is~~ drug Facebook is the dealer.
- b) Reason and observation and the progress of science.

Q.3 Attempt any **one** of the following. (05)

- a) I. Write the process of generating solar energy

II. Getting aeroplane reservation

OR

- b) Write a report on any **one** of the following

I. International book fair

II. Cultural event in your hall

MM: 25

Time: 1 hour

1] When the reference junction of a thermocouple is kept at the ice point and the test junction is at the Celsius temperature T , and e.m.f. E of the thermocouple is given by the equation: $E = aT + bT^2$; where $a = 0.20 \text{ mV}^\circ\text{C}$ and $b = -5.0 \times 10^{-4} \text{ mV}^\circ\text{C}^2$

- (a) Suppose the e.m.f. E is taken as a thermometric property and that a temperature scale T^* is defined by the linear relation $T^* = cE + d$; and that $T^* = 0$ at the ice point and $T^* = 100$ at the steam point. Find the numerical values of c and d . $0, 666.66$
- (b) Find the values of T^* , when $T = -100^\circ\text{C}$. -166.66 (10)

2] Differentiate between:

- (a) Macroscopic and microscopic approaches to thermodynamics
 (b) Thermal equilibrium and thermodynamic equilibrium. (3+3)

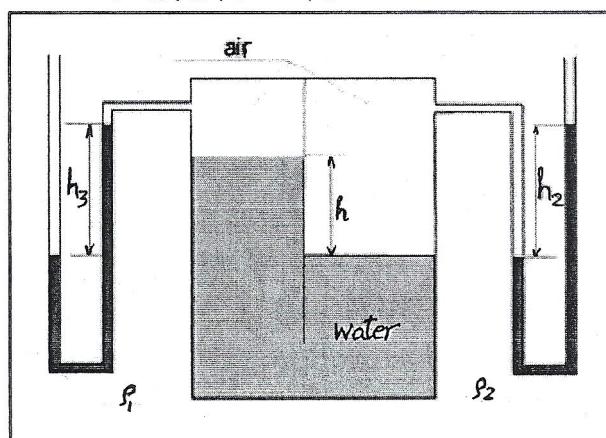
3] (a) What is the mean effective pressure? (3)

(b) An indicator spring is found to require an axial force of 60 N to shorten it by 1.0 mm. The spring is used in an indicator having a piston area of 4 cm^2 and a pencil mechanism which magnifies the motion of the indicator piston six-fold.

- i. Calculate the spring number in N/m^3 .
 ii. A single-cylinder, single-acting, 4-stroke gas engine of 150 mm bore develops an indicator power of 4.5 kW when running at 216 rev/min. Calculate the area of the indicator diagram that would be obtained using the above indicator, given that the length of the diagram is 0.1 times the length of the stroke of the engine. (3)

OR

- 3'] (a) Write the definitions of the following terms: property, state, and process. (3)
 (b) Calculate a formula for manometer reading h_2 for a situation shown in the figure.
 Known values are h , h_3 , ρ_1 , ρ_2 and ρ_w . (6)



Department of Electrical Engineering
Mid Semester Examination Autumn Semester 2013-14

B.Tech First Semester
Basics of Electrical & Electronics Engineering (EE-111)

Time: 1 hour

M.M:25

Note: (i) Answer all questions.

- Question Bank**
- Q.1 (a) Differentiate between active and reactive power (2)
 - (b) Differentiate between reluctance and permeability (2)
 - (c) Define magnetomotive force, magnetic field intensity (2)
 - Q.2 For the circuit shown in figure 1, find the current in branch AB. Apply KVL, KCL (6)
 - Q.3 (a) Give the diode current equation of PN junction diode, explaining each term. (2)
 - (b) Consider a silicon diode with $n=1.5$. Find the change in voltage if the current changes from 0.1mA to 10 mA . (3)
 - Q.4 (a) Draw the characteristics of zener diode, mark the Knee current, Knee voltage and Breakdown region on the characteristic curve. (2)
 - (b) What is the significance of DC load line in a transistor? (2)
 - (c) Why collector current I_C in a transistor is slightly less than the emitter current I_E for a transistor in active region? (1)
 - Q.5 Analyse the circuit in Figure 2 to determine the voltages at all nodes and the currents in all branches. Assume $\beta = 100$ (3)

OR

- Q.5' Analyse the circuit in Figure 3 to determine the voltages at all nodes and the currents through all branches. β is specified to be at least 50. (3)

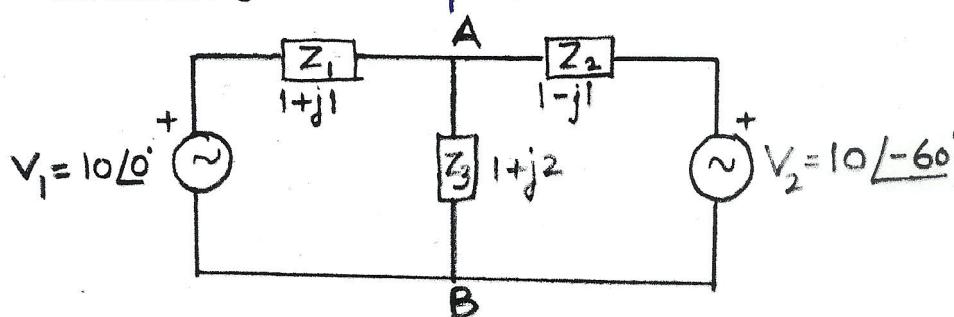


Figure (1)

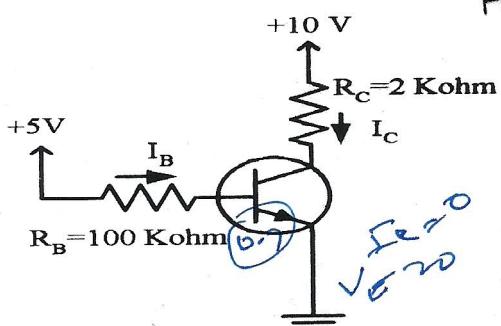


Figure (2)

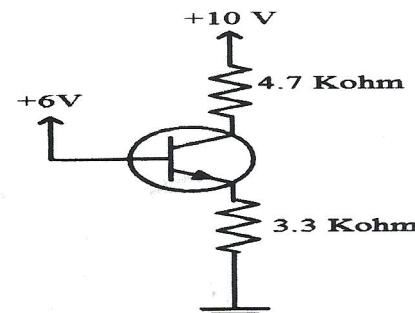


Figure (3)

$$I_C = I_{BE} \times 10^3$$

$$\alpha = 0.7$$

$$\beta = ?$$

Mid-Semester Examination 2013-14

B.Tech/ All Branches Ist yr (Ist Semester)

Applied Chemistry (AC-111)

Time :1 hr

M.M. 25

Attempt all questions

1. Enlist the various steps involved in gravimetric analysis and discuss the significance of nucleation 3
2. Discuss the significance of von-Weimarn ratio in precipitation. 2
3. Write only chemical reaction involved in the following titrations: 2
 - (i) Acid-Base
 - (ii) Precipitation
 - (iii) Chelometric
 - (iv) Redox
4. Distinguish between any two of the followings: 3
 - (i) Occlusion and inclusion
 - (ii) Titrant and analyte
 - (iii) Column and planer chromatography
5. A sample in a 1.0 cm cell was found to transmit 90% light at a certain wavelength. What is the concentration of the substance, if the absorptivity is $3 \text{ log}^{-1} \text{ cm}^{-1}$ 2
6. Mention any four essential requirements for municipal water. 2
7. Write any two disadvantages of the followings: 2
 - (i) Bleaching powder as disinfectant
 - (ii) Scale formation
 - (iii) Ion Exchange process
8. Write any two advantages of the followings: 2
 - (i) Gravity filters
 - (ii) Break point chlorination
 - (iii) Zeolite process
9. Complete the following reactions: 4
 - (i) $\text{Al}_2(\text{SO}_4)_3 + 2\text{H}_2\text{O} \longrightarrow$
 - (ii) $\text{NaAlO}_2 + 2\text{H}_2\text{O} \longrightarrow$
 - (iii) $\text{Mg}(\text{HCO}_3)_2 \xrightarrow{\Delta} \longrightarrow$
 - (iv) $\text{CaSO}_4 + 2\text{C}_{17}\text{H}_{35}\text{COONa} \longrightarrow$
10. A water sample on analysis gave the following data: 3

$\text{MgCl}_2 = 95 \text{ ppm}$, $\text{CaSO}_4 = 272 \text{ ppm}$, $\text{MgSO}_4 = 120 \text{ ppm}$, $\text{H}_2\text{SO}_4 = 49 \text{ ppm}$, $\text{SiO}_2 = 4 \text{ ppm}$.

Calculate the amount of lime and soda required for the treatment of 10000 litres of water.

(At. Mass: Mg=24, Cl=35.5, Ca=40, S=32, O=16, H=1, Si=28)