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FIRST SEMESTER

B.Tech. (ALL)

MID SEMESTER EXAMINATION ***September-2011***

AM-101 MATHEMATICS-I

Time: 1 Hour 30 Minutes ***Max. Marks : 20***

Note : Answer any ***FIVE*** questions out of the eight set.
All questions carry ***EQUAL*** marks.
Assume suitable missing data, if any.

1 State and prove the necessary condition for the convergence of an infinite series with positive terms. Is it sufficient also? Justify your answer.

2 Test the following series for their convergence

(*i*) $\sum \frac{\sqrt{n+1}-\sqrt{n}}{n^p}, \; p>\frac{1}{2}$ (*ii*) $\sum \frac{x^n}{1+x^n}; x>0$

3 Discuss the convergence of series

$$\frac{x}{1}+\frac{1.x^3}{2.3}+\frac{1.3.x^5}{2.4.5}+\frac{1.3.\ 5.}{2.4.\ 6.}\frac{x^7}{7}+\ldots\ldots(x>0)$$

4 Show that absolute convergence implies convergence but converse is not true. Test for the convergence of the series

$$\sum_{n=1}^{\infty}(-1)^n \frac{Cos\ nx}{n^2}.$$

5 Expand $\tan\left(x+\frac{\pi}{4}\right)$ as for as the term x^4. Hence find the value of tan 47° correct upto four decimal points.

6 Show that

$$Sin^{-1}x = x+\frac{1}{2}\cdot\frac{x^3}{3}+\frac{1.3}{2.4}\cdot\frac{x^5}{5}+\frac{1.3.5}{2.4.6}\cdot\frac{x^7}{7}+\ldots\ldots$$

and hence find π correct up to three decimal places.

7. Define the curvature of a curve at an arbitory point P. Show that the curvature of a circle is constant. Find the curvature at $\theta = 0$ for the cycloid

$$x = a(\theta + \sin\theta), \quad y = a(1 - \cos\theta)$$

8. If P_1 and P_2 are the radii of curvatures at the extremeties of a focal chord of the parabola $y^2 = 4ax$, then prove that

$$\rho_1^{-2/3} + \rho_2^{-2/3} = (2a)^{-2/3}.$$

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FIRST SEMESTER **B.Tech. (GROUP-A)**

MID SEMESTER EXAMINATION ***September-2011***

HU-102 COMMUNICATION SKILLS

Time: 1 Hour 30 Minutes *Max. Marks : 20*

Note : Answer ***ALL*** questions.
Assume suitable missing data, if any.

1 I take it that most people who talk glibly of science, including our great industrialists, think of science merely as a kind of handmaiden to make their work easier. Of course, it does make their work easier. But surely science is something more than that. Science, does not merely repeat the old in better ways, or add to the old, but creates something that is new to the world and to human consciousness.

If we pursue this line of thought, what exactly does the spirit of science mean? It means not being tied down to something that is old because it is old, but being able to accept its disintegration; it means not being tied down to a social fabric, or an industrial or an economic fabric, if it goes against the new discovery.

If we approach science in the proper way, it teaches us new ways of doing things. Perhaps it improves our conditions or industrial life, but the basic thing that science should do is to teach us to think straight and not to be afraid of discarding any thing or of accepting any thing, provided there are sufficient reasons for doing so.

[a] What does science create? 1

[b] What is the spirit of science? 1

[c] What does science teach us? 1

[d] Use these words in sentences of your own.
(i) Pursue (ii) Glib 1

[e] Give synonyms for (i) discard (ii) sufficient. (one each) 1

2 Use the following pair of words in sentences of your own:

[a] bail, bale

[b] adapt, adept

[c] judicial, judicious 3

One should not get confused with the usage of the words, bail and bale.

can exercise power on human beings The highly complicated calculations manipulated around the precise movements of celestial bodies, to derive highly subjective conclusions appear illogical to me. As I see it, the Earth is the most powerful and energetic planet.

[a] Explain the meaning of "rational thought matrices of science". 2

[b] What are the author's views on astrology? 2

[c] What appears illogical to the author? 2

[d] Add prefix to make antonyms :

(i) Rational (ii) Precise 2

[e] Use the following words to make sentences:

(i) Guise (ii) Avid 2

4 Use the following idioms in sentences of your own:

[a] A leap in the dark

[b] At the receiving end

[c] Moving the goal posts

[d] Entering a minefield 2

5 Make sentences with the following pair of words:

[a] Adverse , averse

[b] Council, counsel

[c] Momentary, momentous 3

6 Give phonetic transcriptions for the following words : (***Any six***)

[a] Circle ˈsɜːkl

[b] Heir hɪə

[c] Length leŋθ

[d] Know nəʊ

[e] Swing swɪŋ

[f] Thereby ðɪəˈbaɪ

[g] Tap tæp

[h] Fly flaɪ

[i] Think θɪŋk 6

7 Add Question Tags to the following statements

[a] They went with you,.....?

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FIRST SEMESTER **B.Tech. (Group A & B)**

MID SEMESTER EXAMINATION ***September-2011***

AP-103 APPLIED PHYSICS-I

Time: 1 Hour 30 Minutes ***Max. Marks : 20***

Note : Answer *ALL* questions.
Assume suitable missing data, if any.

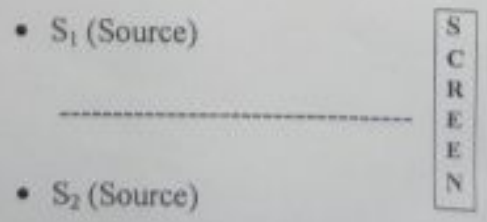
1 A beam of μ-mesons, produced at a height of 20 km in the earth's atmosphere, travels downwards with a velocity of 0.99c. If 99% of the original mesons decay before reaching the earth's surface, find the mean life time of the μ-mesons. 14.62 μs. **4**

2[a] Calculate the length and orientation of a rod of length 5m in a frame of reference which is moving with a velocity 0.6c in a direction making an angle of 30° with the rod. 4.272, 35.31°. **2**

[b] An electron ($m_0 = 0.511$ MeV/c^2) and a photon both have momenta of 2MeV/c. Find the total energy of each. 2.0642, 2. **2**

3[a] In the Newton's rings arrangement if the incident light consists of two wavelengths 400 nm and 400.2 nm. Calculate the distance (from the point of contact) at which rings will disappear. Assume that the radius of curvature of the curved surface is 400 cm. 2.001 **2**

[b] In an arrangement of double slit experiment, the slits are illuminated by light of wavelength 600 nm. Find the distance of the first point on the screen from the central maximum where the intensity is 75% of central maxima.



(The distance between the sources in 0.25 cm & screen is 120 cm apart from source). 0.1029 mm. **2**

4[a] An electron is accelerated to an energy of 2GeV by an electron synchrotron. What is the ratio of the electron's mass to its rest mass. 2

[b] A particle has a velocity $u' = 3\hat{i} + 4\hat{j} + 12\hat{k}\ m/\sec$ in a coordinate system moving with velocity 0.8c relative to laboratory along positive direction of x-axis. Find u in laboratory frame. 3

5 White light, with a uniform intensity across the visible wavelength range of 400 to 690 nm, is perpendicularly incident on a water film, of index of refraction n_2 = 1.33 and thickness L= 320 nm, that is suspended in air. At what wavelength λ is the light reflected by the film brightest to an observer. 3

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FIRST SEMESTER

B.Tech. (GROUP-A)

MID SEMESTER EXAMINATION ***September-2011***

AC-104 APPLIED CHEMISTRY

Time: 1 Hour 30 Minutes ***Max. Marks : 20***

Note : Question No. ***ONE*** is compulsory.
Answer any ***FOUR*** questions from the remaining.
Assume suitable missing data, if any.

1 Answer the following questions:- **1x8**

[a] Write the name and structure of EDTA.

[b] What is the required condition for a molecule to be IR active.

[c] What are the sources of UV-Vis radiation in UV-Vis spectrophotometer?

[d] Draw a general thermogram for multiple decomposition of a molecule.

[e] Name any natural polymeric indicator. Write the molecular formulae for the monomer. starch

[f] Write down any two criterion for a substance to be a primary standard. Give two examples of primary standard.

[g] Give the characteristic IR absorption frequency range for >C =0 & -OH gp. each.

[h] Write the names of all bending vibrations in IR spectroscopy.

2 Explain the mechanism of free radical addition polymerization. **3**

3[a] Write down any four important applications of thermal methods of analysis. **2**

[b] Draw a flow chart diagram of IR spectrometer. **1**

4 A 20.00 mL sample of vinegar, an aqueous solution of acetic acid (CH_3COOH) is titrated with 0.5062 M NaOH and 16.58 mL is required to reach the end point.

[a] What is the molarity of acetic acid? **½**

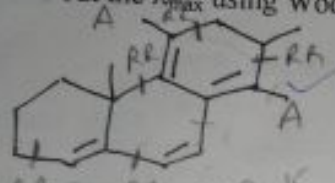
[b] If the density of vinegar is 1.006 g/cm^3, what is the mass percent of acetic acid in the vinegar? **1**

≈ 2-5%

[e] What is a suitable indicator for this titration? Draw the appropriate structures for the change in colour of the indicator. 1½

5 Find out the λ_{max} using Woodward-Fieser rules. 1x3

(a)



253 nm

(b)

215

(c)

217

6 Define and classify titrations. Write short note on precipation titration. 3

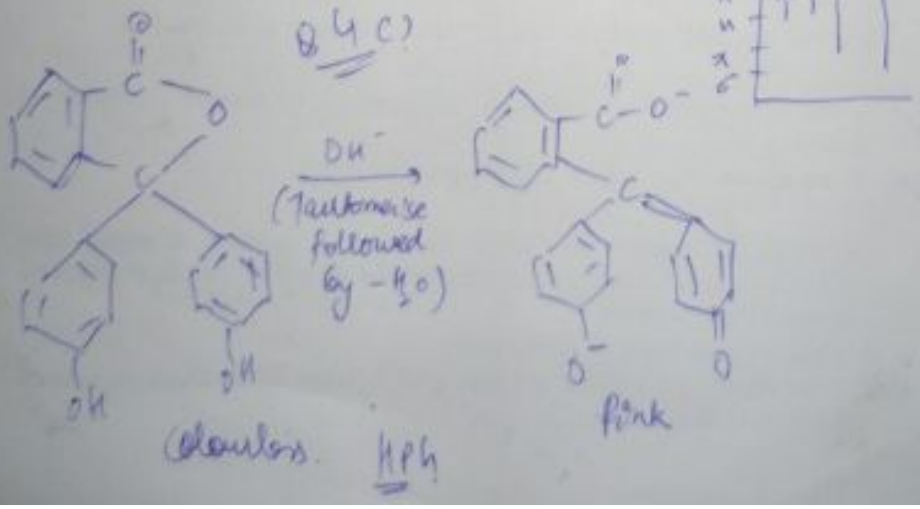
7[a] An aqueous solution containing 8.75 ppm $KMnO_4$ has a transmittance of 0.743 in a 1.00 cm cell at 520 nm. Calculate the molar absorptivity of $KMnO_4$.

(At. Wt. of K = 39, Mn = 55). 2

[b] Arrange the following transitions in the increasing order of energy required. 1

$\pi \rightarrow \pi^*, \sigma \rightarrow \sigma^*, \eta \rightarrow \pi^*, \eta \rightarrow \sigma^*$.

$n-\pi^* < n-\pi^* < \pi-\pi^* < \sigma-\sigma^*$



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FIRST SEMESTER

B.Tech. (GROUP-A)

MID SEMESTER EXAMINATION ***September-2011***

EE-105 ELECTRICAL SCIENCES

Time: 1 Hour 30 Minutes ***Max. Marks : 20***

Note :	Answer *ALL* questions. Assume suitable missing data, if any.

1[a] Using star-delta transformation, determine the resistance between terminals A-N, and the total power drawn from the supply in the circuit below (1-a): (3)

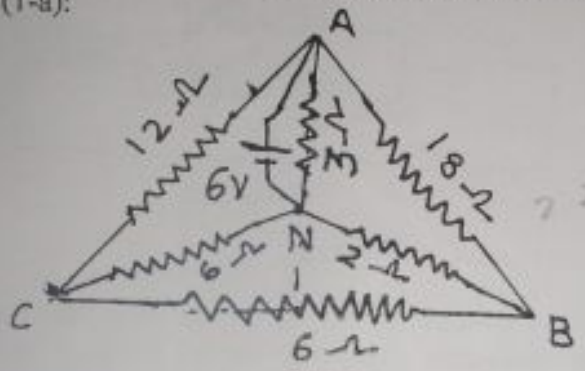
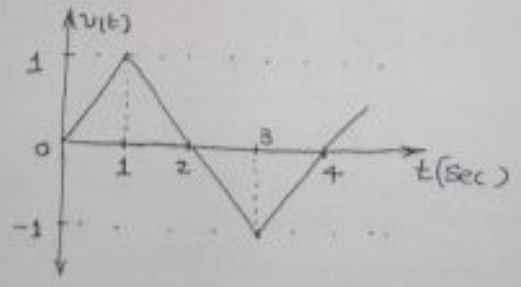


Figure : 1-(a)

[b] Calculate the current through the inductor at t = 1,2,3,4 if a voltage wave form having the time variation shown in Fig.(1-b) below. Take L = 0.1 H (3)



Fig(1-b)

2[a] Calculate the RMS, average, form factor, and peak factor for the following current wave shown in Fig. 2-a. 4

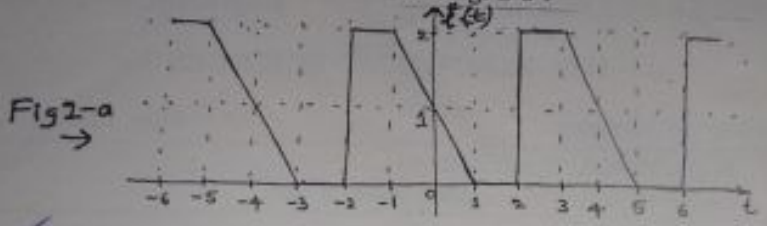
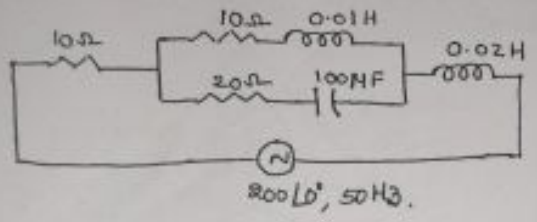


Fig 2-a →

[b] Find the complex power supplied by the source in the circuit shown in (Fig. 2-b) below. Also calculate the power factor of the circuit. 3



(Fig 2-b)

3[a] For the circuit shown in Fig.(3-a) below, determine the current through the 8 ohm resistance connected across terminal A-B, by using thevenin's theorem. 3

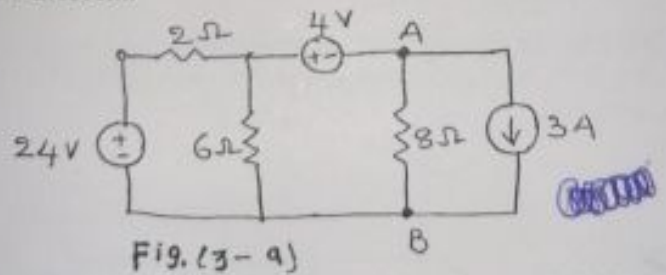
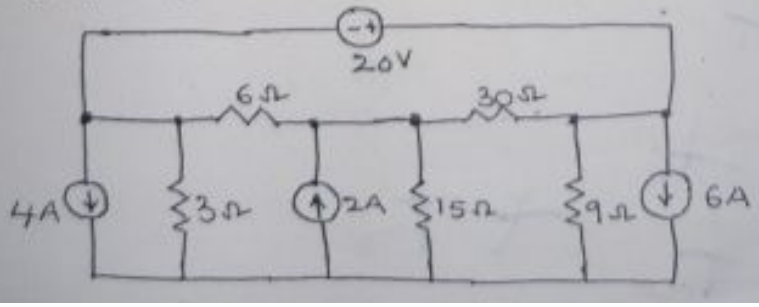


Fig. (3-a)

[b] Analyze the circuit of Fig.(3-b) using node voltages and find the power being supplied by the 6A source. 4



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FIRST SEMESTER

B.Tech. (IT)

MID SEMESTER EXAMINATION ***September-2011***

IT-106 FUNDAMENTALS OF INFORMATION TECHNOLOGY

Time: 1 Hour 30 Minutes ***Max. Marks : 20***

Note : Answer *ALL* questions.
Assume suitable missing data, if any.

1 Differentiate between data and information, giving appropriate examples. **3**

2 Explain the various components of an electronic computer with the help of a block diagram. **5**

3 Perform the following conversions.

[a] $(A67:45)_{16}$ to ($)_{10}$

[b] $(1011.101)_2$ to ($)_8$

[c] $(1011\ 01)_{Gray}$ to ($)_{16}$ **6**

4 Reduce the following expression.

$F = \overline{(A + \overline{BC})}\,(A\overline{B} + ABC)$. **3**

5 Minimize the following expression using K-map.

$f = \Pi M\ (2,8,9,10,11,12,14)$. **3**