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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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SECOND SEMESTER **B.Tech. (EN)**

MID SEMESTER EXAMINATION ***MARCH-2012***

EN-112 ENVIRONMENTAL SCIENCE

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

Note : Answer ***ALL*** questions.
All questions carry equal marks.
Assume suitable missing data, if any.

1 Briefly explain the origin and evolution of earth. 4

2 Describe the various layers and composition of lithosphere. 5

3 Explain carbon cycle and draw a neat labeled diagram of it. 3

4 What do you mean by energy flow in an ecosystem? Describe the models of energy flow. 3

5 Discuss the types of desert ecosystem. 2

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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.

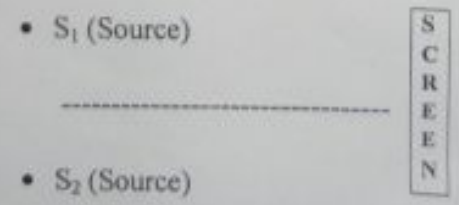
1. A beam of μ-mesons, produced at a height of 20 km in the earth's atmosphere, travels downwards with a velocity of 0.99c. If 99% of the original mesons decay before reaching the earth's surface, find the mean life time of the μ-mesons. 14.82 μs. **4**

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. 0.0019 **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 $u' = 3\hat{i} + 4\hat{j} + 12\hat{k}\ m/\text{sec}$ 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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SECOND SEMESTER **B.Tech. (GROUP-A)**

MID SEMESTER EXAMINATION ***MARCH-2012***

AP/AC-114 ENGINEERING MATERIALS

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

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

PART-A

1 Draw:
(i) (1 0 1) plane
(ii) (1 $\bar{2}$ 1) for simple cubic crystal structure. 2

2 Determine the Miller indices of a plane that makes an intercepts of 2Å, 3Å, and 4Å on the coordinate axis of an orthorhombic crystal structure with a:b:c = 4: 3: 2. 2

3 Explain briefly hydrogen bonding. The enthalphy of fusion of ice is 6.02 KJ mol^{-1}. Estimate the fraction of hydrogen bonds that are broken when ice malts. (Given: Hydrogen Bond energy 20.5 KJ/mol^{-1}). 2

4 What do you meant by 'Fermi Energy-Level in metals. Discuss about Fermi Energy at T = 0°K & T > 0°K. 2

5 Find the relaxation time of conduction electrons in a metal of resistivity 1.54×10^{-8} ohm-m. If the metal has 5.8×10^{28} conduction electrons per m^3. 2

6 Calculate the inter planer spacing for a (321) plane in a simple cubic lattice whose lattice constant is 4.2×10^{-8} cm. 2

PART-B

1[a] What is alloy steel? Discuss heat resisting steels in detail. 2½

[b] What is aluminium bronze? Discuss its composition, characteristics and uses. 2½

[c] Differentiate between continuous phase and reinforcements. Also give suitable examples. 2½

[d] Discuss environmental effects on composite materials in detail. 2½

OR

2[a] What are the characteristics of refractories? Discuss about the dolomite bricks in detail. 2½

[b] Differentiate between earthenwares and stonewares. Discuss the importance of these materials in detail. 2½

[c] What is polypyrrole? How can you prepare it? Discuss its technological applications also. 2½

[d] How the conductivity is correlated with band gap in conjugated polymers? Discuss it by considering polyacetyline and polyparaphenylene polymers. 2½

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SECOND SEMESTER **B.Tech. (Group A)**

MID SEMESTER EXAMINATION ***MARCH-2012***

ME-115 BASIC MECHANICAL ENGINEERING

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

Note : Question No. ***ONE*** is compulsory.
Answer any ***FIVE*** parts questions in Question No.2.
Assume suitable missing data, if any.

1[a] A gas flows steadily through a rotary compressor The gas enters the compressor at a temperature of 16°C, a pressure of 100KPa and an enthalpy of 391.2 KJ/kg. The gas leaves the compressor at a temperature of 245°C, a pressure of 0.6MPa and an enthalpy of 534.5KJ/kg. Heat transfer is negligible. Evaluate (i) the external work done per unit mass of gas assuming the gas velocities at entry and exit to be negligible (ii) the external work done per unit mass of gas when the gas velocities at entry is 80 m/s and that at exit is 160 m/s. 4

[b] Differentiate between (i) microscopic view point and macroscopic view point(ii) Reversible process and Irreversible process. 2

[c] Explain the following (i) concept of contimum (ii) point function and path function (iii) gauge pressure and (iv) Thermodynamic equilibrium. 2

[d] Show from Ist law of thermodynamics that work in an adiabatic process is given by :-

$$W_{1-2} = \frac{P_1V_1 - P_2V_2}{\gamma - 1}$$ 2

OR

[e] Show from Ist law of thermodynamics the work in a polytropic process is given by:-

$$W_{1-2} = \frac{P_1V_1 - P_2V_2}{n - 1}$$ 2

2[a] Discuss types of welding. Also explain welding defects. 2

[b] Name different pattern materials and pattern allowances. What are important moulding materials? 2

[c] Explain different types of flames with their applications. 2

[d] Explain the different elements of gating system. 2

[e] State that principle and working of metal arc welding? 2

[f] Explain the casting process and various casting defects. 2

BTU/11

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

MID SEMESTER EXAMINATION ***MARCH-2012***

COE-116 PROGRAMMING FUNDAMENTALS

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

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

1 Explain the following: 4
[a] Algorithms & Flowcharts
[b] Input & Output Statements

2 Explain the following with syntax, flow chart and relevant coding: 4
[a] The do-while statement
[b] The if-else statement

3 What do you understand by multidimensional arrays? Write a computer program which illustrates how a two dimensional array can be read and how the value stored in the array can be displayed on screen. 4

4 Distinguish between the structure and union. Write a program to find the size of the structure & the union and number of bytes reserved for them. 4

5 Write short notes on any ***TWO*** of the following:
[a] Programming Languages
[d] Coding Style
[e] Subprograms 4