

BTAS-13

Engg. Physics-I

PART-A

Q1- Two thin lenses are in contact and the focal length of the combination is 100 cm. If the focal length of one lens is 20 cm, calculate the power of the other lens. Which type of lens is it ?

Q2- What is a galvanometer ? How can a galvanometer be converted into a voltmeter ?

Q3- Define the molar heat capacity of a substance. Also differentiate between specific heat at constant pressure and volume.

Q4- Explain how sound travels through a medium.

Q5- An ocean wave has a wavelength of 120 m and a period of 8.77 sec. Calculate the frequency and speed of the wave.

PART-B

Q1-What is a "Mirage" and why does it occur ? Explain in detail with the help of a neat diagram.

Q2-Write short notes on any four of the / following :

(A) Venturimeter

(b) Luminous Intensity

(c) Specific Heat Capacity

(d) Compound Microscope

(e) Bernoulli's Equation

BTAS-12

Engg. Mechanics

PART-A

Q1-State Varignon's theorem.

Q2-A force of 210 N inclined at 60° to the horizontal is applied to a block weighing 450 N which is put on a plane. Determine whether the block would move due to application of the force. The coefficient of friction between the block and the plane is 0.5.

Q3-State law of conservation of momentum.

Q4- A wheel is rotating with a constant acceleration of 1 radian/s^2 about its axis. If the initial and final angular velocities are 5.2 radian/s and 10.5 radian/s respectively, determine the total angle turned through during the time interval this change of angular velocity took place.

Q5- State law of polygon of forces in brief.

PART-B

Q1-When a motorcyclist is riding west at 40 km/h, he finds the rain meeting him at an angle of 45° with the vertical. When he rides at 24 km/h, he finds the rain at an angle of 30° with the vertical. What is the actual velocity (magnitude and direction) of the rain ?

Q2-A body of 100 kg has its velocity changed from 6 m/s to 10 m/s in the same direction in 40 seconds. Find

(a) the change in momentum, and

(b) the force responsible for this change.

BTCS-11

COMPUTER SYSTEM AND PROGRAMMING IN C

PART-A

Q1- Write a C program to count and print the number of words in a given string.

Q2- Write a program in 'C' language to implement Bubble Sort.

Q3- Write a program in 'C' language that accepts a file as input and prints the lines of that file in reverse order to standard output. That is, first line will be printed as last line, second line will be printed as last but one line. Make and list any assumptions.

Q4- Write a program in 'C' language that accepts a Matrix as input and prints the sum of all integers on diagonal to standard output. Make necessary assumptions.

Q5- Write a program in 'C' language that accepts a string as input and prints the number of vowels in it.

PART-B

Q1- What is a sparse matrix ? Explain row-major order and column-major order with an example.

Q2- How can array elements be accessed using pointers in C ? Give example.

BTAS-14

ENVIRONMENT AND ECOLOGY

PART-A

- Q1- Explain the operation of rapid sand gravity filters using a neat sketch.
- Q2- Differentiate between type-I and type-II settling processes used in water treatment.
- Q3- Describe the different types of hardness present in water. How are they removed ?
- Q4- Explain the self-purification process of surface water.
- Q5- Explain the processes of coagulation and flocculation used in water treatment.

PART-B

- Q1- Discuss the relative merits and demerits of various disinfectants used in water treatment.
- Q2- Describe the different types of distribution reservoirs used in a water distribution system.

BTAS-12
ENGG. MATHS-1

PART-A

1. Find Eigen values of the matrix

$$\begin{pmatrix} 2 & -3 & 1 \\ 3 & 1 & 3 \\ -5 & 2 & -4 \end{pmatrix}$$

2. Test the consistency of following system of linear equations and hence find the solution

$$4x - y = 12, -x + 5y - 2z = 0, -2y + 4z = -8$$

3. Find the n^{th} derivative of $\frac{x^2}{(x+2)(2x+3)}$

4. If $y = (1 - x)^{-\alpha} e^{-\alpha x}$, prove that

$$(1-x)y_{n+1} - (n+\alpha x)y_n - n\alpha y_{n-1} = 0$$

5. Find rank and nullity of $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

PART-B

1. If $\frac{x^2}{a^2+u} + \frac{y^2}{b^2+u} + \frac{z^2}{c^2+u} = 1$,

Show that

$$\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 + \left(\frac{\partial u}{\partial z}\right)^2 = 2\left(x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}\right)$$

2. Expand the following in powers of x

i) $\sqrt{(1 + \sin x)}$

ii) $e^x \cos x$

iii) $\cos^{-1} \frac{x^2-1}{x^2+1}$

BTAS-11
COMMUNICATION SKILLS

PART-A

- Q1-What is communication ? Write the process of communication.
- Q2-What is written communication ? Give its advantages and disadvantage .
- Q3-Gives in detail of importance of communication in business.
- Q4-Describes barriers to communication .
- Q5-What is principles of effectives communications ?

PART-B

- Q1**-What is verbs? Write its classification.
- Q2-Give 10 idioms and phrase with example.