CBCS Scheme

USN | | | | | | | | | | |

15MAT11

First Semester B.E. Degree Examination, Dec.2015/Jan.2016
Engineering Mathematics - I

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Find the n^{th} derivative of $\frac{x^2}{2x^2+7x+6}$. **(06 Marks)**

b. Find the angle between the curves $r^2 \sin 2\theta = 4$ and $r^2 = 16 \sin 2\theta$. **(05 Marks)**

c. Find the radius of curvature of the curve represented by $x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$. **(05 Marks)**

OR

2 a. If $y = (x + \sqrt{x^2-1})^m$ then prove that $(x^2-1)y_{n+2} + (2n+1)xy_{n+1} + (n^2-m^2)y_n = 0$. **(06 Marks)**

b. Find the pedal equation of $r^n = a(1 + \cos n\theta)$. **(05 Marks)**

c. Find the radius of curvature of the curve $r^n = a^n \sin n\theta$. **(05 Marks)**

Module-2

3 a. Expand $\sin x$ in powers of $(x - \frac{\pi}{2})$ upto fourth degree term. **(06 Marks)**

b. Evaluate $\lim_{x\to 0} \frac{xe^x - \log(1+x)}{x^2}$. **(05 Marks)**

c. If $u = x + y + z$, $uv = y + z$, $uvw = z$ then find $\frac{\partial(x,y,z)}{\partial(u,v,w)}$. **(05 Marks)**

OR

4 a. Find the Maclaurin's series expansion of $\sec x$ upto x^4 term. **(06 Marks)**

b. If $V(x,y) = (1-2xy+y^2)^{-1/2}$ and $x\frac{\partial v}{\partial x} - y\frac{\partial v}{\partial y} = y^2 V^K$, then find K. **(05 Marks)**

c. If $u = \sin^{-1}\left\{\frac{x+2y+3z}{x^8+y^8+z^8}\right\}$ then find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$. **(05 Marks)**

Module-3

5 a. A particle moves along the curve whose parametric equations are $x = t^3 + 1$, $y = t^2$, $z = 2t + 5$ where t is the time. Find the component of its velocity at $t = 1$ in the direction of $I + J + 3K$. Find also the component of its acceleration at $t = 1$ along the normal to $I + J + 3K$. **(06 Marks)**

b. Verify whether $\vec{A} = (2x + yz)\,I + (4y + zx)\,J - (6z - xy)K$ is irrotational or not. And find the scalar potential of $\vec{A}$. **(05 Marks)**

c. If $\vec{A}$ is a vector point function and ϕ is a scalar point function then prove that $\text{div}(\phi\,\vec{A}) = \phi\,\text{div}\,\vec{A} + (\text{grad}\,\phi)\,.\,\vec{A}$. **(05 Marks)**

OR

6 a. If $\vec{f} = x^2 I + y^2 J + z^2 K$ and $\vec{g} = yzI + zxJ + xyK$, then verify whether $\vec{f} \times \vec{g}$ is solenoidal or not. **(06 Marks)**

b. Find the directional derivative of $\phi = x^2 + y^2 + 2z^2$ at P(1, 2, 3) in the direction of line $\overrightarrow{PQ} = 4i - 2j + k$. **(05 Marks)**

c. Prove that curl (grad ϕ) = $\vec{O}$. **(05 Marks)**

Module-4

7 a. Obtain the reduction formula for $\int \sin^n x\, dx$. Hence evaluate $\int_0^{\pi/2} \sin^n x\, dx$. **(06 Marks)**

b. Solve $(4xy + 3y^2 - x)\, dx + x(x+2y)dy = 0$. **(05 Marks)**

c. Find the Orthogonal trajectories of the family $r^n = a^n \sin n\theta$, where a is the parameter. **(05 Marks)**

OR

8 a. Evaluate $\int_0^{\infty} \frac{x^6 dx}{(4+x^2)^{15/2}}$. **(06 Marks)**

b. Solve $x\frac{dy}{dx} + y = x^3 y^6$. **(05 Marks)**

c. A body is heated to 110^0C and placed in air at 10^0C. After one hour its temperature become 60^0C. How much additional time is required for it to cool to 30^0C? **(05 Marks)**

Module-5

9 a. Solve the following system of equations by Gauss – Jordan method :
$x + y + z = 8$; $-x - y + 2z = -4$; $3x + 5y - 7z = 14$. **(06 Marks)**

b. Verify the transformation $y_1 = 19x_1 - 9x_2 + 2x_3$; $y_2 = -4x_1 + 2x_2 - x_3$; $y_3 = -2x_1 + x_2$ is regular or not and find the inverse transformation if possible. **(05 Marks)**

c. Reduce the matrix to the diagonal form

$$A = \begin{pmatrix} 1 & 1 \\ 3 & -1 \end{pmatrix}.$$ **(05 Marks)**

OR

10 a. Solve the following system by Gauss – Seidal method : **(06 Marks)**
$20x + y - 2z = 17$; $3x + 20y - z = -18$; $2x - 3y + 20z = 25$. Perform three iterations.

b. Determine the largest eigen value and the corresponding eigen vector of

$$A = \begin{pmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{pmatrix}$$ using Power method. **(05 Marks)**

Take $(1, 0, 0)^T$ as the initial eigen vector and perform four iterations.

c. Reduce the quadratic form :
$8x^2 + 7y^2 + 3z^2 - 12xy + 4xz - 8yz$ into canonical form. **(05 Marks)**

* * * * *

CBCS Scheme

USN | | | | | | | | | | |

15CHE12

First Semester B.E. Degree Examination, Dec.2015/Jan.2016

Engineering Chemistry

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Derive Nernst equation for single electrode potential. **(05 Marks)**

b. What is electrolyte concentration cell? The emf of the cell $Cu/CuSO_{4(0.001M)}||\ CuSO_{4(XM)}/Cu$ is 0.0595V at 25°C. Find the value of X. **(05 Marks)**

c. Explain the following battery characteristics :
   i) Cell potential
   ii) Capacity
   iii) Shelf life. **(06 Marks)**

OR

2 a. Define reference electrode. Discuss the construction and working of calomel electrode. **(05 Marks)**

b. Describe the construction and working of Ni-MH battery. Mention its applications. **(05 Marks)**

c. What is fuel cell? Distinguish between conventional cell and fuel cell. **(06 Marks)**

Module-2

3 a. Define corrosion. Explain the electro-chemical theory of corrosion by taking iron as an example. **(06 Marks)**

b. Explain the following factors affecting corrosion. **(05 Marks)**
   i) Ratio of anodic to cathodic areas
   ii) Nature of corrosion product
   iii) Temperature.

c. Describe electroplating of nickel using Watt's bath. Mention its applications. **(05 Marks)**

OR

4 a. Explain differential aeration corrosion with one example. **(05 Marks)**

b. What is metal finishing? Mention the technological importance of metal finishing. **(06 Marks)**

c. Define electroless plating. Distinguish between electroplating and electroless plating. **(05 Marks)**

Module-3

5 a. Explain the determination of calorific value of a solid fuel using bomb calorimeter. **(06 Marks)**

b. What is reforming of petroleum? Give any three reactions involved in reforming. **(05 Marks)**

c. What is photovoltaic cell? Explain the construction and working of photovoltaic cell. **(05 Marks)**

OR

6 a. 0.75g of coal sample (carbon-90%), hydrogen-6% and ash 4%) was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 3500g and the water equivalent of the calorimeter was 750g. The rise in temperature was found to be 3.2°C. Calculate the gross and net calorific values of a sample (Specific heat of water = 4.187kJ/Kg/°C ; Latent heat of steam = 2454kJ/Kg) **(05 Marks)**

b. Explain the modules, panels and arrays of PV cells. **(06 Marks)**

c. Explain the production of solar grade silicon by Union – Carbide process. **(05 Marks)**

Module-4

7 a. Explain the types of polymerization with example. **(04 Marks)**

b. What is glass transition temperature? Discuss any two factors affecting the glass transition temperature. **(06 Marks)**

c. Explain the synthesis and applications of the following :
   i) Plexi glass
   ii) Polycarbonate **(06 Marks)**

OR

8 a. In a polymer sample, 20% of molecules have molecular mass 15000g/mol, 45% molecules have molecular mass 25000g/mol remaining molecules have molecular mass 27000g/mol, calculate the number average, weight average molecular mass of the polymer. **(06 Marks)**

b. Explain the synthesis, properties and applications of silicone rubber. **(05 Marks)**

c. Explain the mechanism of conduction in polyaniline **(05 Marks)**

Module-5

9 a. Explain the scale and sludge formation in boiler. **(05 Marks)**

b. Define COD. Discuss the experimental determination of COD of waste water. **(06 Marks)**

c. Write a note on fullerences. **(05 Marks)**

OR

10 a. Explain desalination of sea water by ion selective electrodialysis process. **(05 Marks)**

b. Explain the synthesis of nano materials by Sol-Gel process. Mention its advantages. **(06 Marks)**

c. Write a note on carbon nano tubes. **(05 Marks)**

* * * * *

(3)

CBCS Scheme

USN | | | | | | | | | | |

15PHY12

First Semester B.E. Degree Examination, Dec.2015/Jan.2016
Engineering Physics

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.

2. Physical Constants: Velocity of light, $c = 3 \times 10^8$ ms^{-1}
Planck's constant, $h = 6.625 \times 10^{-34}$ JS
Mass of electron, $m = 9.1 \times 10^{-31}$ kg
Boltzmann constant, $K = 1.38 \times 10^{-23}$ JK^{-1}
Avogadro number, $N_A = 6.02 \times 10^{26}$/Kmol.

Module-1

1 a. Show that Planck's law reduces to Wein's law and Rayleigh-Jeans law at lower and higher wavelength limits respectively. **(06 Marks)**

b. Setup time independent Schrodinger wave equation in one dimension. **(06 Marks)**

c. A particle of mass 940 MeV/c^2 has kinetic energy 0.5 KeV. Find its de-Broglie wavelength, c is velocity of light. **(04 Marks)**

OR

2 a. Define phase velocity and group velocity. Obtain the relation between them. **(06 Marks)**

b. Using Heisenberg's uncertainty principle, prove that electrons cannot exist in a nucleus. **(06 Marks)**

c. The first excited state energy of an electron in an infinite well is 240 eV. What will be its ground state energy when the width of the potential well is doubled? **(04 Marks)**

Module-2

3 a. What is Fermi energy? Discuss the probability of occupation of various energy states by electron at T = 0K and T ≥ 0K on the basis of Fermi factor. **(06 Marks)**

b. What is Meissner's effect? Explain Type-I and Type-II super conductors. **(06 Marks)**

c. The effective mass for the electron in germanium is 0.55 m_0, where m_0 is the free electron mass. Find the electron concentration in Germanium at 300 K, assuming that the Fermi level lies exactly in the middle of the energy gap, given that the energy gap for Germanium is 0.66 eV. **(04 Marks)**

OR

4 a. Explain the success of quantum free electron theory. **(06 Marks)**

b. Explain the law of mass action and derive the expression for electrical conductivity of a semiconductor. **(06 Marks)**

c. 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. **(04 Marks)**

Module-3

5 a. Obtain an expression for energy density of radiation in terms of Einstein's coefficients. **(06 Marks)**

b. What is numerical aperture? Obtain an expression for numerical aperture in terms of refractive indices of core and cladding of an optical fiber. **(06 Marks)**

c. The ratio of population of two energy levels is 1.059×10^{-30}. Find the wavelength of light emitted at 330 K. **(04 Marks)**

OR

6 a. Explain construction and working of carbon dioxide laser device. **(06 Marks)**

b. With neat diagrams, explain different types of optical fibers. **(06 Marks)**

c. The attenuation of light in an optical-fiber is 2 dB/km. What fraction of its initial intensity remains after (i) 2 km, (ii) 5 km? **(04 Marks)**

Module-4

7 a. Define lattice points. Explain the crystal structure of diamond with neat sketch. **(06 Marks)**

b. Illustrate the procedure to find miller indices of a given plane and calculate the atomic packing factor for FCC. **(06 Marks)**

c. A beam of x-ray with wavelength 1.5 A; undergoes second order Bragg's reflection from the plane (211) of cubic crystal at glancing angle 54.38°. Calculate the lattice constant. **(04 Marks)**

OR

8 a. What is Bravais lattice? Obtain an expression for the interplanar spacing of planes in terms of Miller indices for cubic lattice. **(06 Marks)**

b. Describe the construction and working of a Bragg's x-ray spectrometer. **(06 Marks)**

c. Draw the following planes in a cubic unit cell:

i) (1 0 2) ii) (1 1 2) iii) (2 0 0) iv) $(1\ \bar{1}\ 0)$ **(04 Marks)**

Module-5

9 a. Describe the construction and working of Reddy's shock tube. **(06 Marks)**

b. What are nanomaterials? Write a note on sol-gel method of preparing nanomaterials. **(06 Marks)**

c. Define Mach number, subsonic waves, supersonic waves and Mach angle. **(04 Marks)**

OR

10 a. Describe the principle, construction and working of a scanning electron microscope. **(06 Marks)**

b. Explain the structures and applications of Carbon nanotubes. **(06 Marks)**

c. The distance between the two pressure sensors in a shock tube is 150 mm. The time taken by a shock wave to travel this distance is 0.3 ms. If the velocity of sound under the same condition is 340 ms^{-1}. Find the Mach number of the shock wave. **(04 Marks)**

* * * * *

(4)

CBCS Scheme

USN | | | | | | | | | | |

15PCD13

First Semester B.E. Degree Examination, Dec.2015/Jan.2016
Programming in C ad Data Structures

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. What is variable? Explain the rules for constructing variables in C language. Give examples for valid and invalid variables. **(06 Marks)**

b. Evaluate the following expressions :
i) 100% 20 < = 20 – 5 + 100% 10 – 20 = = 5 > = 1 != 20
ii) a += b *= c –= 5 where a = 3 b = 5 and c = 8. **(04 Marks)**

c. Write a C program to find the area and perimeter of a rectangle. **(06 Marks)**

OR

2 a. Write a C program which takes as input p, t, r. Compute the simple interest and display the result. **(06 Marks)**

b. Convert the following mathematical expression into C expressions :
i) $\frac{x}{b+c}+\frac{y}{b-c}$ ii) $a+\frac{b(ad+e)}{b-a}-\frac{c}{d}$. **(04 Marks)**

c. What is value of "x" in following code segments? Justify your answers :

i)
```
int a, b ;
float x ;
a = 4 ;
b = 5 ;
x = b/a ;
```

ii)
```
int a, b ;
float x ;
a = 4 ;
b = 5 ;
x = (float) b/a ;
```

(06 Marks)

Module-2

3 a. Explain the syntax of do-while statement. Write a C program to find the factorial of a number using do-while, where the number n is entered by user. **(08 Marks)**

b. What is two way selection statement? Explain if, if else, and cascaded if-else with examples. **(08 Marks)**

OR

4 a. Write a C program that takes from user an arithmetic operator ('+', '–', '*' or '/') and two operands. Perform the corresponding arithmetic operation on the operands using switch statement. **(08 Marks)**

b. What is an array? How to declare and initialize the two dimensional array? **(08 Marks)**

Module-3

5 a. What is a function? Write a C program to find the cube of a number using function. **(05 Marks)**

b. Write a C program to check a number is a prime or not using recursion. **(05 Marks)**

c. Write a program to replace each constant in a string with the next one except letter 'z' 'Z' and 'a', 'A'. Thus the string "programming in C is fun" should be modified as "Qsphsannjoh jo D jt gvo". **(06 Marks)**

OR

6 a. Write a C program to sort the elements by passing array as function argument. **(08 Marks)**

b. Write a C program to concatenate two strings without using built – in function strcat( ). **(08 Marks)**

Module-4

7 a. What is structure? Explain the C syntax of structure declaration with example. **(05 Marks)**

b. Write a C program to pass structure variable as function argument. **(07 Marks)**

c. Explain fopen( ) and fclose( ) functions. **(04 Marks)**

OR

8 a. Write a C program to store and print name, USN, subject and IA marks of students using structure. **(08 Marks)**

b. Explain fputc( ) , fputs( ), fgetc( )and fgets( ) functions with syntax. **(08 Marks)**

Module-5

9 a. What is a pointer? Write a C program to find the sum and mean of all elements in an array using pointer. **(08 Marks)**

b. What is stack? Explain its operations with examples. **(08 Marks)**

OR

10 a. Write a C program to swap two numbers using call by address. **(06 Marks)**

b. Explain any five preprocessor directives in C. **(05 Marks)**

c. What are primitive and non–primitive data types? Explain with examples. **(05 Marks)**

* * * * *

(5)

CBCS Scheme

USN | | | | | | | | | | |

15CIV13

First Semester B.E. Degree Examination, Dec.2015/Jan.2016
Elements of Civil Engineering & Engineering Mechanics

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Briefly explain the scope of any four fields of civil engineering. **(08 Marks)**

b. Draw typical cross section of road and explain its components. **(08 Marks)**

OR

2 a. Write short notes on: i) Shoulders ii) Kerbs iii) Traffic separators. **(06 Marks)**

b. Resolve 300 N force acting on a block as shown in Fig. Q2 (b):
i) Into horizontal and vertical components.
ii) Along the inclined plane and right angles to the plane. **(10 Marks)**

Module-2

3 a. State and prove Lami's theorem. **(06 Marks)**

b. Determine the resultant of forces which are acting as shown in the Fig.Q3 (b). **(10 Marks)**

OR

4 a. State and prove Parallelogram law of forces. **(10 Marks)**

b. Explain with sketches : i) Cone of friction ii) Angle of repose. **(06 Marks)**

Module-3

5 a. State and prove Varignon's theorem. **(06 Marks)**

b. Find the magnitude, direction and position of the resultant with respect to the point A for the force system shown in Fig. Q5 (b). **(10 Marks)**

OR

6 a. Explain the different types of supports in the analysis of beams. **(06 Marks)**

b. Determine the support reaction at A and B for the beam shown in Fig. Q6 (b). **(10 Marks)**

Module-4

7 a. State and prove parallel axis theorem. **(08 Marks)**

b. Determine Centroid of the area shown in Fig. Q7 (b). **(08 Marks)**

OR

8 a. Determine the moment of inertia and radii of gyration of the area shown in Fig. Q8 (a) about the base AB and centroidal axis parallel to AB. **(08 Marks)**

b. Determine the moment of inertia of triangle of base width 'b' and height 'h' about the base. **(08 Marks)**

Module-5

9 a. Define : i) Displacement ii) Speed iii) Velocity iv) Acceleration. **(06 Marks)**

b. A cricket ball thrown from a height of 1.8 m above ground level at an angle of 30° with the horizontal with velocity of 12 m/s and is caught by fielder at a height of 0.6 m above the ground. Determine the distance between the two players. **(10 Marks)**

OR

10 a. A stone is dropped into a well and a sound of splash is heard after 4 s. Find the depth of well. **(08 Marks)**

b. Determine the position at which the ball in thrown up the plane will strike the inclined plane as shown in Fig. Q10 (b). The initial velocity is 30 m/s and angle of projection is $\tan^{-1}\left(\frac{4}{3}\right)$ with horizontal. **(08 Marks)**

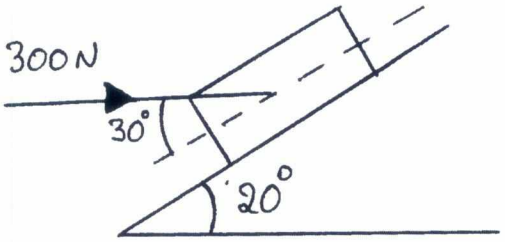


Fig. Q2 (b)

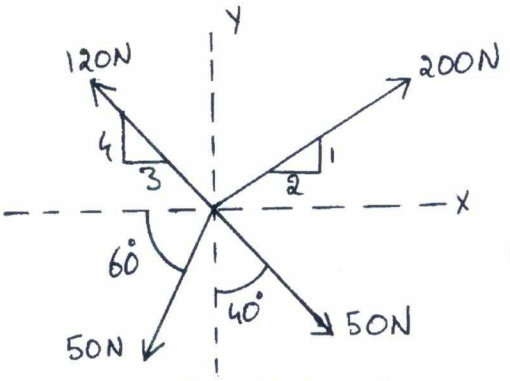


Fig. Q3 (b)

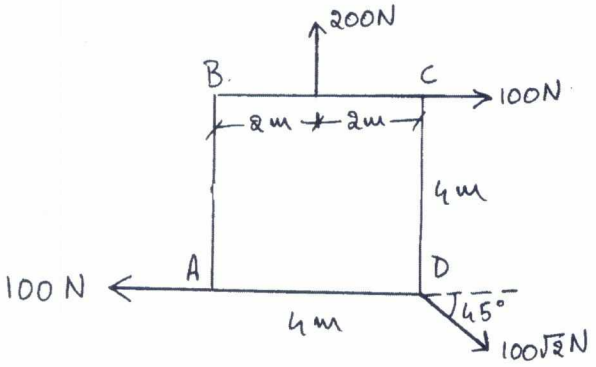


Fig. Q5 (b)

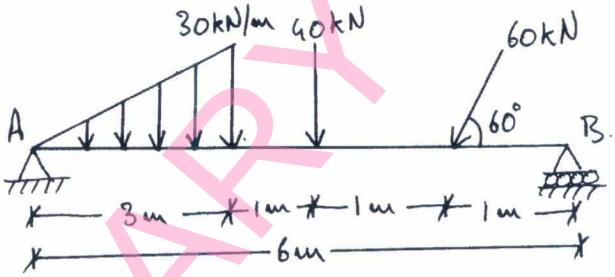


Fig. Q6 (b)

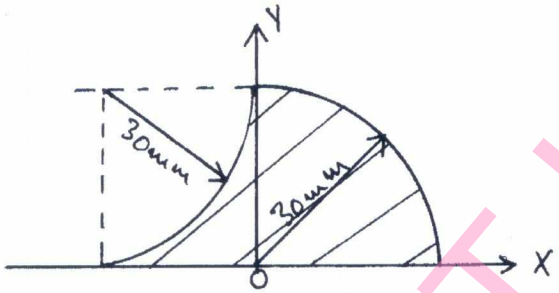


Fig. Q7 (b)

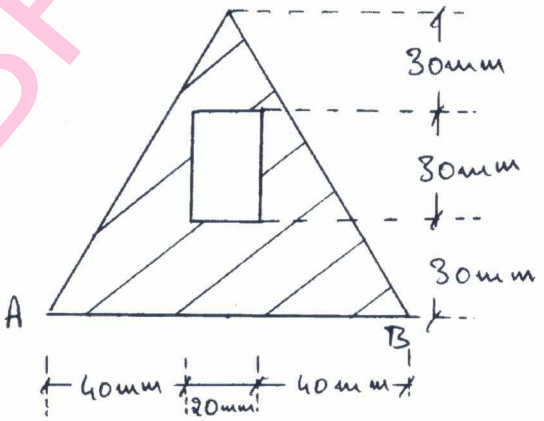


Fig. Q8 (a)

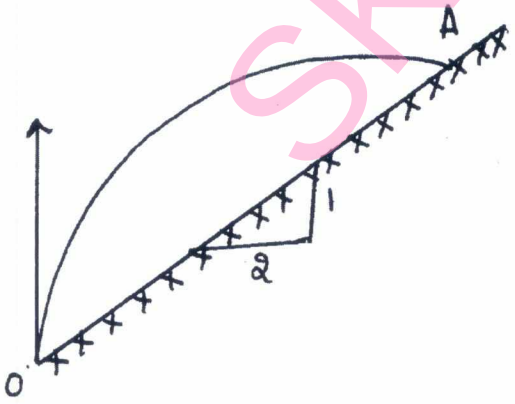


Fig. Q10 (b)

* * * * *

CBCS Scheme

USN | | | | | | | | | | |

15EME14

First Semester B.E. Degree Examination, Dec.2015/Jan.2016
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Define solar constant and explain liquid flat plate collector with a neat sketch. **(08 Marks)**

b. Explain principle of nuclear power plant with a neat sketch. **(08 Marks)**

OR

2 a. Define enthalpy and explain formation of steam with a T-S diagram. **(08 Marks)**

b. Explain Babcock and Wilcox boiler with a neat sketch. **(08 Marks)**

Module-2

3 a. Define Turbine & explain De Laval turbines with a neat sketch and P-V diagram. **(08 Marks)**

b. Explain closed cycle gas turbine with a neat sketch. **(08 Marks)**

OR

4 a. Explain 4-stroke SI engine with a neat sketch and PV diagram. **(08 Marks)**

b. Define indicated power and brake power. A four stroke IC engine running at 450 rpm has a bore diameter of 100 mm and stroke length 120 mm. The indicator diagram details are : Area of the diagram 4 cm^2, length of the indicator diagram 6.5 cm and the spring value of the spring used is 10 bar/cm. Calculate indicated power of the engine. **(08 Marks)**

Module-3

5 a. Explain with neat sketches,
i) Plain milling
ii) End milling.
iii) Slot milling. **(08 Marks)**

b. Explain the following machining operations on lathe machine with suitable sketches:
i) Turning.
ii) Thread cutting.
iii) Knurling
iv) Facing **(08 Marks)**

OR

6 a. Write classification of robot configurations and explain Cartesian coordinate with a suitable sketch. **(08 Marks)**

b. Define automation and explain flexible and fixed automation. **(08 Marks)**

Module-4

7 a. Write classification of ferrous and non-ferrous metals and explain briefly. **(08 Marks)**

b. Write a short note on composites. **(08 Marks)**

OR

8 a. Define soldering and explain electric arc welding with a suitable sketch. **(08 Marks)**

b. Explain oxy-acetylene welding process with a sketch. **(08 Marks)**

Module-5

9 a. Define the following:

i) Ton of refrigeration.

ii) Refrigerating effect.

iii) Ice making capacity

iv) COP **(08 Marks)**

b. Explain principle and working of vapour compression refrigeration with a sketch. **(08 Marks)**

OR

10 a. Explain with a sketch working of room air conditioner. **(08 Marks)**

b. List out properties of a good refrigerant and explain any two. **(08 Marks)**

* * * * *

CBCS Scheme

USN | | | | | | | | | | |

15ELN15

First Semester B.E. Degree Examination, Dec.2015/Jan.2016
Basic Electronics

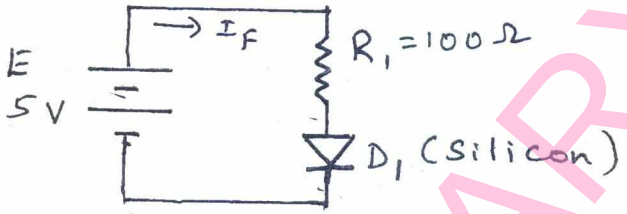
Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. For the circuit shown in fig.Q1(a) draw the DC load line and locate Q – pt. **(04 Marks)**

Fig.Q1(a)



b. What is the need for capacitor filter? For a Half – Wave Rectifier, explain the operation of C – filter. **(06 Marks)**

c. Considering npn transistor in common emitter configuration, explain how it acts as voltage amplifier. **(06 Marks)**

OR

2 a. Explain the working of a Bridge Full – Wave Rectifier, with a neat circuit diagram and waveforms. **(06 Marks)**

b. Discuss the load and line regulation using zener diode with neat circuit diagram and appropriate expressions. **(06 Marks)**

c. Calculate the values of I_C and I_E for a BJT with $\alpha_{dc} = 0.97$ and $I_B = 50\ \mu A$. Determine β_{dc}. **(04 Marks)**

Module-2

3 a. Precisely analyse the circuit of voltage divider bias and hence determine the V_C and V_{CE}. Mention the advantages of voltage divider bias. **(10 Marks)**

b. Derive an equation for output voltage for a non – inverting Op – amp. Find the gain of amplifier if $R_F = 10K\Omega$ and $R_1 = 1K\Omega$. **(06 Marks)**

OR

4 a. A base bias circuit with a 12V supply uses a transistor with $h_{FE} = 70$. Design the circuit so that $I_C = 2mA$ and $V_{CE} = 9V$ (Assume $R_E = 0$). **(06 Marks)**

b. Explain the working of Op – amp as integrator. **(05 Marks)**

c. Derive the expression of 3 input summing amplifiers. **(05 Marks)**

Module-3

5 a. Convert the following : i) $172.625_{(10)} = (\quad)_2$ ii) $(ABCD.72)_{16} = (\quad)_8$
iii) $(1\,0\,1\,1\,1\,1\,0\,1\,.\,0\,1\,0\,1)_2 = (\quad)_{10}$. **(06 Marks)**

b. Perform the following operations using 1's and 2's compliment technique
i) $(56)_{10} - (79)_{10}$ ii) $(23)_{10} - (18)_{10}$. **(06 Marks)**

c. State and prove de Morgan's theorem using truth table for 2 variables. **(04 Marks)**

OR

6 a. Explain full adder circuit with truth table. Realise the circuit for sum and carry using basic gates. Also write the diagram showing FA using two half adders. **(06 Marks)**

b. Simplify and realize the following expressions using only NAND and NOR.

i) $Y = (A + \overline{B})(B + C)(\overline{C} + \overline{B})$ ii) $Y = AB + AC + BD + CD$. **(10 Marks)**

Module-4

7 a. Explain the operation of NOR Latch with symbol, circuit and truth table. **(06 Marks)**

b. With a neat block diagram, explain the architecture of 8051 microcontroller. **(10 Marks)**

OR

8 a. How is Flip – Flop different from a Latch? Explain the gated RS Flip – Flop with symbol, circuit and truth table. **(08 Marks)**

b. Interface stepper motor to 8051 microcontroller with a neat block diagram. Explain its working principle. **(08 Marks)**

Module-5

9 a. Explain Amplitude Modulation with relevant waveforms. Derive the equation for instantaneous value of modulated signal in volts and define modulation index. **(08 Marks)**

b. Define the term transducer. Mention any four characteristics a transducer should posess. **(02 Marks)**

c. Briefly explain the working of thermistor. Mention its applications. **(06 Marks)**

OR

10 a. Explain the frequency modulation with necessary waveforms. Bring out the difference between AM and FM. **(08 Marks)**

b. Explain construction and the principle of operation of LVDT. **(08 Marks)**

* * * * *

CBCS Scheme

USN | | | | | | | | | | |

15ELE15

First Semester B.E. Degree Examination, Dec.2015/Jan.2016
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. State ohm's law. Mention its limitations. **(05 Marks)**

b. A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 mWb. Calculate: (i) self inductance, (ii) The emf induced, (iii) The energy stored when a current s reversed in 0.01 sec. **(05 Marks)**

c. A circuit of two parallel resistors having resistance of 20Ω and 30Ω respectively, connected in series with 15Ω. If the current through 15 Ω resistor is 3A, find (i) current in 20Ω and 30Ω resistors, (ii) voltage across the whole circuit, (iii) The total power and power consumed in all resistors. **(06 Marks)**

OR

2 a. Define dynamically induced emf and statically induced emf with examples. **(05 Marks)**

b. State and explain Kirchoff's current law and Kirchoff's voltage law. **(06 Marks)**

c. In the network shown in Fig.Q2(c), determine current flow in the ammeter 'A' having resistance of 10 Ω.

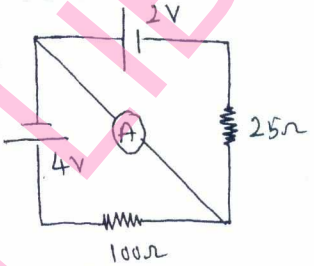


Fig.Q2(c) **(05 Marks)**

Module-2

3 a. Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its applications. **(06 Marks)**

b. With the help of neat diagram, explain the construction and working principle of electrodynamometer type wattmeter. **(06 Marks)**

c. An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected? **(04 Marks)**

OR

4 a. Derive EMF equation of DC generator. **(04 Marks)**

b. With a neat diagram, explain the construction and working of a induction type energy meter. **(06 Marks)**

c. A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 Ω and that of the shunt field winding is 200 Ω. The motor takes 21A and flux/pole is 30 mWb. Find speed and gross torque developed in the motor. **(06 Marks)**

Module-3

5 a. Explain two way control of lamps with truth table and connection diagram. **(05 Marks)**

b. An alternating voltage (80+j60)V is applied to a circuit and the current flowing is (-4+j10)A. Find: (i) the impedance of the circuit, (ii) the phase angle, (iii) power consumed. **(05 Marks)**

c. Two impedances $z_1 = (10 + j15)\Omega$ and $z_2 = (6 - j8)\Omega$ are connected in parallel. If the total current supplied is 15A, what is power taken by each branch? **(06 Marks)**

OR

6 a. Show that power consumed in an AC circuit is P = VI cos ϕ, where V is RMS value of the applied voltage, I is the RMS value of current and ϕ is the angle between voltage V and current I. **(05 Marks)**

b. What is earthing? Explain any one type of earthing with neat figure. **(06 Marks)**

c. A coil of power factor 0.6 is in series with 100 μF capacitor. When connected to a 50 Hz supply, the potential difference across the coil is equal to potential difference across the capacitor. Find the resistance and inductance of the coil. **(05 Marks)**

Module-4

7 a. Mention the advantages of three phase system over single phase system. **(05 Marks)**

b. Three similar coils each having resistance of 10Ω and reactance of 8Ω are connected in star, across 400 V, 3 phase supply. Determine (i) line current, (ii) total power, (iii) reading of each of two wattmeter connected to measure power. **(06 Marks)**

c. A 2 pole 3phase alternator running at 3000 rpm has 42 slots with 2 conductors per slot. Calculate the flux per pole, required to generate a line voltage of 2300 V. Assume $K_d = 0.952$ and $K_p = 0.956$. The armature is star connected. **(05 Marks)**

OR

8 a. With the help of a circuit diagram and vector diagram, show that two wattmeters are sufficient to measure total power and power factor in a balanced three phase circuit. **(08 Marks)**

b. With neat sketches, explain the construction of salient pole alternator. **(04 Marks)**

c. A three phase load of three equal impedances connected in delta across a balanced 400 V supply, takes a line current of 10 A at a power factor of 0.7 lagging. Calculate:
i) the phase current, ii) the total power, iii) the total reactive volt amperes. **(04 Marks)**

Module-5

9 a. Derive EMF equation of transformer. **(04 Marks)**

b. The maximum efficiency at full load and Upf of a single phase, 25 kVA, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load 0.6 pf. **(08 Marks)**

c. If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor. **(04 Marks)**

OR

10 a. Derive the condition for which the efficiency of a transformer is maximum. **(06 Marks)**

b. Define slip. Derive an expression for frequency of rotor current. **(05 Marks)**

c. A three phase 6 pole 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Determine: i) Synchronous speed, (ii) No load speed, (iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v) Frequency of rotor current at full-load. **(05 Marks)**

* * * * *

(10)

CBCS Scheme

15CIV18

USN | | | | | | | | | | |

Question Paper Version : C

First Semester B.E. Degree Examination, Dec.2015/Jan.2016

Environmental Studies

(COMMON TO ALL BRANCHES)

Time: 2 hrs. Max. Marks:40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fourty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

---

1. Carbon cycle involves,
   a) Amonia, Nitrate & Protiens
   b) Carbondioxide, water & Energy
   c) Sulphur dioxide, sulphate
   d) All of these

2. Dental caries in children may be caused due to water supplies deficient in,
   a) Fluorides b) Calcium c) Nickel d) Iron

3. As per BIS, the permissible limit of PH value of drinking water is,
   a) 7.0 b) 6.5 – 7.5 c) 6.0 – 8.5 d) 6.5 – 8.5

4. India has the world's largest share of,
   a) Manganese b) Copper c) Mica d) Diamond

5. Cow dung can be used as,
   a) Manure b) Production of biogas c) both a & b d) None of these

6. Direct conversion of solar energy is attained by,
   a) Solar photo voltaic system
   b) Galvanic cells
   c) Electrolytic cells
   d) Hydrogen cells

7. Which of these is used as moderator in nuclear reactor,
   a) Graphite b) Helium gas c) Heavy water d) All of these

8. Mineral is a _____,
   a) Organic matter
   b) Synthetic compound
   c) Naturally occurring inorganic substance
   d) None of these

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

9. Components of GIS,
a) Software b) Hardware c) Data d) All of these

10. Electromagnetic radiation propagate energy with a velocity of,
a) 3×10^{8} m/sec b) 3.3×10^{8} m/sec c) 0.3×10^{8} m/sec d) 5.0×10^{-8} m/sec

11. Remote sensing is a,
a) Sensor system b) Satellite system c) Ground segments d) All of these

12. Karnataka state pollution control board was established in the year,
a) 1974 b) 1982 c) 1986 d) 1990

13. Objectives of wild life Act 1972 of India is,
a) Preserve the biodiversity b) Protection and conservation of wild life
c) To maintain essential ecological life supporting d) All of these

14. Which one is a NGO?
a) CPCB b) Narmada Bachao Andolan c) KSPCB d) None of these

15. The leader of Chipko movement is,
a) Sunderlal Bahuguna b) Medha Patkar c) Vandana Shiva d) Suresh Heblikar

16. Environmental (Protection) Act was enacted in the year.
a) 1992 b) 1999 c) 1986 d) 1972

17. The word Environment is derived from,
a) Greek word b) French c) English d) Spanish

18. A simple Detrius food chain starts with,
a) Green plants b) Waste of organisms c) Soil d) None of these

19. Amount of fresh water availability on earth is,
a) 2.0 % b) 3.5% c) 2.2% d) 0.6%

20. Anthropological activities means,
a) Natural activities b) Bacterial activities
c) Wild animal activities d) Human activities

21. Intensive agriculture led to deposition of excessive quantity of _____ into aquatic & terrestrial ecosystem.
a) Sulphur b) Nitrogen c) Phosphours d) None of these

22. Sustainable development requires change in,
a) Utilization of natural resources b) Consumption of energy
c) Elimination of waste d) All of these

23. EIA can be expanded as,
a) Environment and Impact activities b) Environmental impact assessment
c) Environment for agriculture d) Environment for industrial act.

24. The upper most layer of atmosphere is called,
a) Exosphere b) Thermosphere c) Measosphere d) Atmosphere

25. Smog is combination of,
a) Smoke and Fog b) Snow and Fog c) Smoke & Snow d) All of these

26. Bhopal gas tragedy occurred due to the leakage of,
a) Sulphur dioxide b) Methyl Isocynate c) Methane gas d) Coal ash

27. Noise is measured in which units?
a) Joule b) dB c) NTU d) PPB

28. Which of the following compounds may be toxic to human beings?
a) Amino acids b) Vitamins c) Proteins d) Polychlorinated bi-phenyls

29. World environmental day is celebrated every year on:
a) 5th May b) June 5th c) July 5th d) 18th June

30. Population stabilization is essential for,
a) Sustainable development b) Economic growth
c) Agricultural improvement d) Industrial development.

31. As compared to 1960, net solid waste generation has,
a) Descreased because recycling programs are now in place.
b) Stayed the same despite rising population
c) Increased even with recycling programs in place.
d) None of these

32. Chlorine can be used,
a) To kill pathogenic micro organisms b) To increase oxygen
c) To clear turbidity d) All of these

33. The diesel vehicles pollute environmental largely through,
a) NO b) Co c) Hydro carbons d) All of these

34. Acid rain increase day by day due to,
a) Urbanization b) Hydropower plants c) Industrialization d) Increase in vehicles

35. International protocol to protect the ozone layer is,
a) Kyoto protocol b) Montereal protocol c) Vienna protocol d) Basal protocol

36. The major cause of global population growth in the 18 and 19 centuries was,
a) Decrease in Death rate b) Decrease in birth rate
c) Industrial revolution d) None of these

37. The term Acid rain was first referred in the year,
a) 1972 b) 1978 c) 1852 d) 1872

38. Global atmospheric temperature likely to be increased due to,
a) Water pollution b) Burning fossil fuel c) Soil erosion d) Noise pollution

39. Ozone hole was first discovered over,
a) Arctic b) Tropical region c) Antarctica d) Africa

40. Freons are,
a) CFC b) HFC c) NFC d) Hydrocarbon

* * * * *

(12)

CBCS Scheme

15CPH18

USN | | | | | | | | | | |

Question Paper Version : B

First Semester B.E. Degree Examination, Dec.15/Jan.2016

Constitution of India, Professional Ethics and Human Rights
(COMMON TO ALL BRANCHES)

Time: 2 hrs. Max. Marks:40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fourty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

---

1. One of the essential of the Engineering profession is
   a) Hardwork b) Engineering skill c) Honesty d) Expert knowledge

2. The right to life and personal liberty does not include
   a) The right to legal aid b) The Assembly peacefully
   c) The right to privacy d) The right to dignity

3. 73rd and 74th Constitutional Amendments are related to :
   a) Land Reforms b) Anti defection law
   c) Local Self - government d) Extension of reservation to SoS and STs.

4. Article 20 provides the protection to the accused on the principle, "No Person shall be prosecuted and punished for the same offence more than once" is :
   a) Ex- Post facto law b) Multizeo Pardy
   c) Double zeo Pardy d) Acquittance

5. In an Engineering Professional Ethics, a'fault – tree' is a method used to
   a) Claim compensation b) fix the liability on Employer
   c) Assess the honesty of Engineers d) Assess the risk involved

6. The term of member of Rajya Sabha is
   a) 5 years b) 4 years c) 6 years d) 3 years

7. The 'Money Bill' can be introduced only in
   a) Cabinet meetings b) Joint - Session
   c) Rajya Sabha d) Lok Sabha

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

8. A Judge of the High Court holds office until he attains the age of
   a) 58 years b) 60 years c) 62 years d) 65 years

9. Which test is to be followed to classify the people into categories or group under the Article 14?
   a) Creamy layer b) Caste or religion
   c) Intelligible differentia d) Educational qualification

10. Stealing of intellectual property means :
    a) Cooking b) Forging c) Plagiarism d) Trimmings

11. 'Panchayat Raj', as introduced in 1959, is mainly aimed to
    a) Educate the farmers, who are residing at the villages
    b) Provide rural employment to the village people
    c) Promote the working for the up liftment of scheduled caste
    d) Develop and to improve the conditions of people by introducing a Self government at the village, taluk and district levels.

12. The 'Writ of Mandamus' shall not be issued to do their duty, against
    a) Public servant b) President of India
    c) International Airport authorities d) Prime Minister of India

13. Who appoints the Chairman of the Union Public Service Commission?
    a) President b) Prime Minister
    c) Parliament d) Chief Justice of India

14. The head of the City Corporation is
    a) Commissioner of Corporation b) Deputy Commissioner of District
    c) Municipal President d) Mayor

15. $\frac{1}{3}^{rd}$ of seats are reserved for women in
    a) The Cabinet b) The Vidhan Sabha
    c) The Local – Self Government d) The Lok Sabha

16. The Supreme Court has original Jurisdiction to decide the
    a) Dispute between two or more states
    b) Dispute between India and Pakistan
    c) Dispute arises at different levels of Self government
    d) Criminal cases filed directly to Supreme Court by any citizen.

17. Which one is not the way of misusing truth worthiness?
    a) Patenting b) withholdings information
    c) Deliberate information d) lying

18. Which part of the Constitution contains provisions regarding the implementation of Panchayat Raj in the Country?
    a) The Preamble b) Part – III dealing with Fundamental Rights
    c) Part – IV dealing with directive principles
    d) None of these.

19. The Oath of office to the President of India is administered by
    a) The Chief Justice of India
    b) The Vice – President of India
    c) Attorney – General of India
    d) Prime Minister of India

20. The Chief Justice and other Judges of the Supreme Court hold office :
    a) For life
    b) Till the age of 60 years
    c) Till the age of 62 years
    d) Till the age of 65 years

21. One of the following is not included under the category of 'Human Rights' :
    a) Right to life and liberty
    b) Right to Equality
    c) Right to dignity
    d) Rights of prohibition of employment of children in factories.

22. Which Court has authorized to decide the cases of violation of Human Rights?
    a) Supreme Court b) High Court c) Session Court d) Civil Court

23. Who is the Presiding officer of the Joint – Session of Parliament?
    a) Prime Minister
    b) Parliamentary affairs Minister
    c) President
    d) Speaker

24. Sexual harassment of a working women is violation of
    a) Human Right
    b) Fundamental Right
    c) Directive principle
    d) Fundamental duty

25. The federal feature of the Indian Constitution provides for :
    a) Distribution of legislative powers between the Union Government and the State Government.
    b) Division of powers between the Executive and Judiciary.
    c) Distribution of powers between the Lok Sabha and Rajya Sabha.
    d) Distribution of powers between the Prime Minister and Cabinet.

26. How many members are nominated by the President to the Lok Sabha by the Anglo – Indian Community?
    a) Two b) Twelve c) Twenty d) One

27. The main objectives of the Directive principles of State policy are aimed to secure a :
    a) Secular State
    b) Welfare State
    c) Non – religious State
    d) State of Integrity

28. One of the impediments to discharge the responsibility of Engineers is :
    a) Interference by Superior officials
    b) Political influence
    c) Self deception
    d) Lack of talent and skill

29. Who is the appointing authority of the chair person and other members of National Human Rights commission in India?
    a) Chief Justice of India
    b) President of India
    c) Prime Minister of India
    d) Union Home Minister

30. Under which Amendment, a new Article 21 – A was inserted and it provides for "Right to Education" was made a fundamental Right?
a) The 76th Amendment (1994) b) 86th Amendment (2002)
c) The 91st Amendment (2003) d) The 42nd Amendment (1976)

31. Which of the following is not treated as an intellectual property?
a) Patent b) Copy right c) Statute d) Trade mark

32. The Chief Election Commissioner can be removed from his office before the expiry of term by the :
a) Chief Justice of India
b) Prime Minister on the recommendation of cabinet.
c) President on the recommendation of Parliament after the Impeachment.
d) President on the advice of Chief Justice of India.

33. An arrested person is to be produced before the Magistrate within
a) 48 hours b) 36 hours c) 2 months d) 24 hours

34. Who has proposed the "Doctrine of Rule of Law"?
a) Montesqueua b) Mahatma Gandhi
c) Dr. A.V. Dicey d) Austin

35. Directive principles of State Policy (Part - IV) are included in our Constitution from Articles :
a) 36 to 51 b) 12 to 35 c) 39 to 54 d) 330 to 342

36. Who was the first chair person of National Human Rights Commission?
a) Shri Justice M.N. Venkatachaliah b) Shri Justice Ranganath Mishra
c) Shri A.P.J Abdul Kalam d) None of these

37. To whom the Indian Constitution has given the power to pardon the sentence of Death?
a) Chief Justice of Supreme Court b) Governor of State Government
c) President of Union Government d) Both (b) and (c)

38. What are the provisions which cannot be suspended during National emergency?
a) Arts. 14 to 16 b) Arts. 20 and 21 c) Arts.29 and 30 d) Arts. 23 and 24

39. When did the National Human Rights Commission is established in India?
a) 1966 b) 1983 c) 1993 d) 1994

40. For any violation of Fundamental Rights enshrined under Part – III, the High Court or Supreme Court can issue
a) An Ordinance b) A Notification c) A Writ d) A decree

*****