University Question Papers
(KTU) I & II

2015 - 2016

SREE BUDDHA COLLEGE OF ENGINEERING , PATTOOR
FIRST YEAR - SUBJECT DETAILS

Slot	Course No.	Subject	Branch
A	MA101	Calculus	All Branches
	MA102	Differential Equations	All Branches
B(1/2)	PH100	Engg. Physics	All Branches
	CY100	Engg. Chemistry	All Branches
C	BE101	Engg. Mechanics	All Branches
	BE110	Engg. Graphics	All Branches
E	BE 103	Introduction to Sustainable Engg.	All Branches
D	BE 102	Design and Engineering	All Branches
F(1/4)	CE100	Basic Civil Engg.	All Branches
	ME100	Basic Mechanical Engg.	All Branches
	EE100	Basics of Electrical Engg.	All Branches
	EC100	Basics of Electronics Engg.	All Branches
D	BE101-01	Introduction to Civil Engineering	CE
	BE101-02	Introduction to Mechanical Engineering Sciences	ME
	BE101-03	Introduction to Electrical Engineering	EE
	BE101-04	Introduction to Electronics Engineering	EC
	BE101-05	Introduction to Computing and Problem Solving	CS
	BE101-06	Introduction to Chemical Engineering	BT

Reg. No.:_____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: MA101

Course Name: CALCULUS

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each question carries 3 marks

1. Show that the series $\sum\limits_{k=1}^{\infty} \dfrac{\cos k}{k^2}$ is convergent.

2. Find $\dfrac{d}{dx}\left(e^x \operatorname{sech}^{-1}\sqrt{x}\right)$

3. Identify the surfaces $5x^2 - 4y^2 + 20z^2 = 0$

4. Equation of a surface in spherical coordinates is $\rho = \sin\theta\sin\varphi$
   Find the equation of this surface in rectangular coordinates.

5. Given $f = e^x \sin y$; show that the function satisfies the Laplace equation $f_{xx} + f_{yy} = 0$

6. Let $w = 4x^2 + 4y^2 + z^2$, where $x = \rho\sin\varphi\cos\theta,\ y = \rho\sin\varphi\sin\theta,\ z = \rho\cos\varphi$ Find $\dfrac{\partial w}{\partial \rho}$
   using chain rule.

7. A particle moves along a circular helix in 3-space so that its position vector at time t is
   $r(t) = (4\cos\pi t)i + (4\sin\pi t)j + tk$ Find the displacement of the particle during theinterval
   $1 \le t \le 5$

8. Find the tangent to the curve $r(t) = (t^2 - 1)i + t j$ at $t = 1$

9. Evaluate $\int_1^a \int_1^b \dfrac{dy\,dx}{xy}$

10. The line $y = 2 - x$ and the parabola $y = x^2$ intersect at the points $(-2, 4)$ and $(1, 1)$. If R is the region enclosed by $y = 2-x$ and $y = x^2$,then find $\iint_R (y)\,dA$

(10 x 3 = 30 Marks)

PART B

Answer any 2 complete questions each having 7 marks

11. Find the radius of convergence and interval of convergence of the series $\sum_{k=1}^{\infty} \dfrac{(x-5)^k}{k^2}$.

12. Test the convergence of $\dfrac{x}{12} + \dfrac{x^2}{23} + \dfrac{x^3}{34} + \cdots \ldots \ldots$

13. Find the Taylors series of $\dfrac{1}{x}$ about $x = 1$.

10103

Reg. No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2016

Course Code: MA101

Course Name: CALCULUS

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. Evaluate $\int_0^1 sinh^2(2x)\, dx$

2. Check whether the series $\sum_{k=1}^{\infty} \frac{1}{2k-1}$ converges or not.

3. Identify the quadric surface $6x^2 + 3y^2 + 4z^2 = 24$

4. Convert $(2\sqrt{3}, \pi/3, 6)$ from cylindrical to spherical co-ordinates.

5. Find the rate of change of $f(x,y)=xe^{-y} + 5y$ with respect to x at the point (4,0) with y held fixed.

6. If $f(x,y) = x^2y^3 + x^4y$. Find f_{xy}

7. Evaluate $\int_1^9 \left(\left(\frac{t}{2}\right)i + (t - \frac{1}{2})\hat{j}\right) dt$

8. Find $\frac{d\bar{u}}{dt}$ if $\bar{u}(t) = (3t\,i + 5\,t^2 j + 6\,k) \cdot (t^2\,i + 2t\,j + t\,k)$

9. Sketch the region of integration in $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2)dydx$

10. Evaluate $\int_0^1 \int_0^1 \int_0^1 e^{(x+y+z)}\, dx\, dy\, dz$

A

PART B

Answer any 2 complete questions each having 7 marks

11. A ball is dropped from a height of **h** feet and on each bounce rises 75% of the distance it has fallen previously. If it travels a distance of 21 feet what is h?

12. Use Ratio Test for absolute convergence to find whether the series

$$\sum_{k=1}^{\infty} \frac{(-1)^{k+1}2^k}{k!} \text{ converges.}$$

13. Find the Maclaurin's Series for $\frac{1}{1-x}$

Answer any 2 complete questions each having 7 marks

14. For the surface $4x^2 + 9y^2 + 18 z^2 = 72$

    a. Find the equation of the elliptical trace in the plane

    b. $z = \sqrt{2}$

    c. Find the length of the major and minor axes of the ellipse.

15. Find $\lim\limits_{(x,y)\to(0,0)} (x^2 + y^2)\ln(x^2 + y^2)$

16. Let $f(x, y) = \frac{x^2 - y^2}{x^2 + y^2}$. Determine the limit of f (x, y) as

    (x, y) approaches (0, 0) along the curve C. where C is

    (a) x = 0   (b) y = 0   (c) y = x

    (d) $y = x^2$ (e) $x = y^2$

Answer any 2 complete questions each having 7 marks

17. Use chain rule to find $\frac{dw}{ds}$ *at* $s = 1/4$ if

$$w = r^2 - r\tan\theta; \quad r = \sqrt{s}; \quad \theta = \pi s$$

18. Locate all relative extrema and saddle points of $f(x,y)=x^2+xy-2y-3x+1$

19. The volume V of a right circular cone of radius r and height h is given by $V = \frac{1}{3}\pi r^2 h$. Suppose that the height decreases from 20 to 19.95 units and the radius

2

increases from 4 to 4.05 units. Compare the change in volume of the cone with an approximation of this change using a total differential.

Answer any 2 complete questions each having 7 marks

20. The temperature in degree Celsius at a point in the (x, y) plane is

$$T(x, y) = \frac{xy}{1 + x^2 + y^2}$$

Find the rate of change of temperature at $(1,1)$ in the direction of $(2\hat{\imath} - \hat{\jmath})$.

21. Find the scalar tangential and normal components of acceleration at time t of a particle with position vector at time t is $r(t) = t\hat{i} + t^2\hat{j} + t^3\hat{k}$

22. Find the equation of the tangent plane and parametric equation for the normal line to the surface $x^2 + y^2 + z^2 = 25$ at $P(3,0,4)$

Answer any 2 complete questions each having 7 marks

23. Evaluate $\iint\limits_{R} \sin\theta\, dA$ where R is the region in the first quadrant that is outside the circle $r = 2$ and inside the cardioid $r = 2(1 + \cos\theta)$.

24. Find the Jacobian $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ where $x = 4u + v$, $y = u - 2w$, $z = v + w$.

25. By changing the order of integration evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy\, dx$

A

10105

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, AUGUST 2016

Course Code: MA101

Course Name: CALCULUS

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. Find derivative of y = sinh (4x-8)

2. Test whether the series converges or diverges, $\sum_{k=1}^{\infty} \frac{k}{2^k}$

3. Identify the surface $z = y^2 - x^2$

4. Convert from rectangular to spherical co-ordinates, $(2\sqrt{3}, 2, -4)$

5. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $Z = \cos\ (xy^3)$

6. Show that $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$ if $z = x^2y + 5y^3$.

7. Evaluate $\int_0^2 (2t\hat{\imath} + 3t^2\hat{\jmath})dt$

8. Find the arc length of the parametric curve x=e^t, y=e^{-t} ,z = $\sqrt{2}$ t ,0≤t≤ 1.

9. Evaluate $\int_1^3 \int_2^4 (40 - 20\ xy\ )\ dy\ dx$

10. Evaluate $\int_0^3 \int_0^2 \int_0^1 (xyz\ )\ dx\ dy\ dz$

PART B

Answer any 2 complete questions each having 7 marks

11. Test the convergence of the series $\sum_{k=1}^{\infty} \frac{k(k+3)}{(k+1)(k+2)(k+5)}$

12. Show that $\sinh^{-1} x = \ln\left(x + \sqrt{x^2 + 1}\right)$

13. Find the Taylor series of $\frac{1}{x+2}$ about x =1.

Answer any 2 complete questions each having 7 marks

14. Express the equation $x^2 - y^2 - z^2 = 0$ in cylindrical and spherical coordinates.

A

15. Evaluate $\lim_{(x,y) \to (0,0)} [\sin (\sqrt{x^2 + y^2})]/(x^2 + y^2)$ by converting to polar coordinates.

16. Show that the functions $f(x, y) = 3x^2 y^5$ and $f(x, y) = \sin(3x^2 y^5)$ are continuous everywhere.

Answer any 2 complete questions each having 7 marks

17. Let L(x, y) denote the local linear approximation to $f(x, y) = \sqrt{x^2 + y^2}$ at the point (3, 4). Compare the error in approximating $f(3.04, 3.98) = \sqrt{(3.04)^2 + (3.98)^2}$ by L (3.04, 3.98) with the distance between the points (3,4) and (3.04, 3.98).

18. Suppose that $w = x^2 + y^2 - z^2$ and $x = \rho \sin \phi \cos \theta$, $y = \rho \sin \phi \sin \theta$, $z = \rho \cos \phi$. Use appropriate form of the chain rule to find $\dfrac{\partial w}{\partial \rho}$ and $\dfrac{\partial w}{\partial \theta}$

19. Locate the relative extrema and saddle points of $f(x, y) = 3x^2 - 2xy + y^2 - 8y$

Answer any 2 complete questions each having 7 marks

20. Let $f(x, y) = x^2 e^y$. Find the maximum value of a directional derivative at (-2,0) and find the unit vector in the direction in which the maximum value occur.

21. Find the angle between the tangent lines to the graphs of $r_1(t) = \tan^{-1} t\, i + \sin t\, j + t^2 k$

$r_2(t) = (t^2 - t)i + (2t - 2)j + \log t\, k$

22. Suppose that a particle moves through 3-space so that its position vector at time

t is r(t) = ti + t²j + t³k .

Find the scalar tangential and normal components of acceleration at time t = 1.

Answer any 2 complete questions each having 7 marks

23. Use a polar double integral to find the area enclosed by the circle $r = \sin\theta$

24. Use a triple integral to find the volume of the solid within the cylinder $x^2 + y^2 = 9$ and between the planes $z = 1 \; and \; z = 5$

25. Evaluate $\iint\limits_{R} \dfrac{x - y}{x + y} \, dA$ where R is the region enclosed by $x - y = 0, x - y = 1, x + y = 1,$

$x + y = 3$

Reg. No. : ....   Name : ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016

MA 102 : DIFFERENTIAL EQUATIONS

Max. Marks : 100   Duration : 3 Hours

PART – A

Answer **all** questions and **each** question carries **3** marks.

1. Determine a linearly independent solution of the differential equation $(x^2 + 1) y'' - 2xy' + 2y = 0$ if $y_1 = x$ is solution.

2. Solve the differential equation $y^{IV} + 6y^{III} + 9y^{II} = 0$.

3. Find the particular integral of the differential equation $(D^2 - 2D + 1)y = xe^x$.

4. Solve by the method of variation parameters, $(D^2 + 4)y = \tan 2x$.

5. Develop the Fourier series of $f(x) = x^2$ in $-2 \le x \le 2$.

6. Find the Fourier sine series of $f(x) = e^x$ in $0 < x < 1$.

7. Obtain the partial differential equation by eliminating f and g from $z = xf(y) + yg(x)$.

8. Solve the partial differential equation $(y^2 + z^2)p - xyq + xz = 0$.

9. Obtain the solution of the wave equation $\dfrac{\partial^2 u}{\partial x^2} = \dfrac{1}{c^2}\dfrac{\partial^2 u}{\partial t^2}$ using method of separation of variables when the separation constant $k < 0$.

10. Write any two assumptions involved in deriving one dimensional wave equation.

11. Find the steady state temperature distribution in a rod of length 20 cm if the ends of the rod are kept at 10° C and 70° C.

12. Solve $\dfrac{\partial u}{\partial t} = h\dfrac{\partial^2 u}{\partial x^2}$ subject to the conditions $u(0, t) = u(1, t) = 0$ for $t > 0$ and $u(x, 0) = 3\sin n\pi x$, $0 < x < 1$.

(12×3 = 36 Marks)

P.T.O.

PART – B

Answer **six** questions – **one full** question from **each** Module.

Module – 1

13. a) Reduce to first order and hence solve the ODE
    i) $y'' + (y')^3 \cos y = 0$ and
    ii) $2xy'' = 3y'$.

    b) Solve the IVP $y'' - 2y' + 5y = 0$, $y(0) = -3$, $y'(0) = 1$.   **11**

OR

14. a) Show that the functions x and $x \ln(x)$ are linearly independent (use Wronskian). Hence form an ODE for the given basis x, $x \ln(x)$.

    b) Solve the IV $Py'' + 0.2 y' + 4.01 y = 0$, $y(0) = 0$, $y'(0) = 2$.   **11**

Module – 2

15. a) Solve the differential equation $(D + 1)^2 y = x^2 e^x$.

    b) Solve the differential equation $(x^3 D^3 + 3x^2 D^2 + xD + 1)y = x + \log x$.   **11**

OR

16. a) Solve the differential equation $(D^2 + 1)y = x^2 e^x + \sin x$.

    b) Solve the differential equation $(x + 1)^2 y'' + (x + 1)y' - y = 2 \sin \log(x + 1)$.   **11**

Module – 3

17. a) Find the Fourier Series of $f(x) = \begin{cases} x & , \ 0 < x < 1 \\ 1-x & , \ 1 < x < 2 \end{cases}$

    b) Find the Fourier cosine series of $f(x) = x(\pi - x)$ in $0 < x < \pi$.   **11**

OR

18. a) Expand $f(x) = e^{-x}$ in $(-l, \ l)$ as a Fourier Series.

    b) Find the half range sine series of $f(x) = x \sin x$ in $0 < x < \pi$.   **11**

Module – 4

19. a) Form the PDE by eliminating a, b, c from $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} = 1$.

   b) Solve the partial differential equation $\dfrac{\partial^2 z}{\partial x^2} + \dfrac{\partial^2 z}{\partial x \partial y} - 2\dfrac{\partial^2 z}{\partial y^2} = e^{2x+y}$. **11**

OR

20. a) Solve : $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$.

   b) Solve the partial differential equation $\dfrac{\partial^3 z}{\partial x^3} - 4\dfrac{\partial^3 z}{\partial^2 x \partial y} + 4\dfrac{\partial^3 z}{\partial x \partial y^2} = \cos(2x + y)$. **11**

Module – 5

21. A tightly stretched string of length 'a' with fixed ends is initially in equilibrium position. Find the displacement $u(x, t)$ of the string if it is set vibrating by giving each of its points a velocity $v_0 \sin(\pi x/a)$. **10**

OR

22. A transversely vibrating string of length 'a' is stretched between two points A and B. The initial displacement of each point of the string is zero and the initial velocity at a distance x from A is $kx(a - x)$. Find the form of the string at any subsequent time. **10**

Module – 6

23. Find the temperature in a laterally insulated bar of length L whose ends are kept at temperature zero if the initial temperature is $f(x) = \begin{cases} x & , \ 0 < x < L/2 \\ L - x & , \ L/2 < x < L \end{cases}$. **10**

OR

24. An insulated rod of length L has its ends A and B maintained at 0° C and 100° C respectively until steady state conditions prevails. If B is suddenly reduced to 0° C and maintained at 0° C, then find the temperature in the rod at a distance x from A at time t. **10**

A

SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2016
Course Code: MA-102
Course Name: DIFFERENTIAL EQUATIONS

Max. Marks: 100   Duration: 3 hrs

PART A
Answer all questions Each carries 3 marks

(1) Find the general solution of $y''' - y = 0$

(2) Find the wronskian of the following $e^{-x}\cos 5x$; $e^{-x}\sin 5 x$

(3) Solve $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{2x}$

(4) Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = x^2$

(5) Express $f(x) = x$ as a Fourier series in the interval $-\pi < x < \pi$

(6) Obtain the half range Fourier sine series for the function e^x in $0 < x < 2$

(7) Form the partial differential equation by eliminating the arbitrary function from
$z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$

(8) Solve $p\sqrt{x} + q\sqrt{y} = \sqrt{z}$

(9) Using the method of separation of variables solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x,0) = 3e^{-5x}$

(10) State the one dimensional wave equation with boundary conditions and initial conditions for solving it

(11) In the Heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ what does α^2 indicate. State the boundary and initial conditions for solving it

(12) Find the steady state temperature distribution in a rod of length 25cm, if the ends of the rod are kept at 20^0c and 70^0c.

PART B
Answer one full question from each module
Module -I

(13)   (a) Solve $y''' - 8y'' + 37 y' - 50 y = 0$ (6)

(b)Determine all possible solutions to the initial value problem
$$y' = 1 + y^2, y(0) = 0 \quad in \quad |x| < 3, |y| < 2 \tag{5}$$

OR

(14) (a)Find the general solution of $y^{iv} - y''' - 9\ y'' - 11\ y' - 4\ y = 0$ (6)

(b)Determine all possible solutions to the initial value problem

$$y' = y^{\frac{1}{2}}, y(0) = 0. \tag{5}$$

Module - II

(15) (a)Solve by method of variation of parameters $\dfrac{d^2y}{dx^2} + y = xsinx.$ (6)

(b)Solve $\dfrac{d^2y}{dx^2} - 2\dfrac{dy}{dx} + y = xe^x \sin x.$ (5)

OR

(16) (a)Solve $x^2\dfrac{d^2y}{dx^2} - 2x\dfrac{dy}{dx} - 4y = x^2 + 2\log x.$ (6)

(b)Solve $\dfrac{d^2y}{dx^2} - 4\dfrac{dy}{dx} + 3y = sin3xsin2x.$ (5)

Module - III

(17) (a)Obtain the Fourier series for the function f(x) given by

$$f(x) =$$

$$\begin{cases} 1 + \dfrac{2x}{\pi} & -\pi \le x \le 0 \\ 1 - \dfrac{2x}{\pi} & 0 \le x \le \pi \end{cases}$$ (6)

(b)Obtain the Fourier series to represent the function

$$f(x) = |sinx|; -\pi < x < \pi \tag{5}$$

OR

(18) (a)Expand the function $f(x) = x \sin x$ as a Fourier series in the interval $-\pi \le x \le$ (6)

(b)Find the half range cosine series for the function $f(x) = x^2$ in the range $0 \le x \le \pi$ (5)

Module - IV·

(19) (a) Solve $\frac{\partial^3 z}{\partial x^3} - 2\frac{\partial^3 z}{\partial x^2 \partial y} = 5e^{3x} - 7x^2 y.$ (6)

(b) Solve $(x + y)zp + (x - y)zq = x^2 + y^2$ (5)

OR

(20) (a) Solve $\frac{\partial^3 z}{\partial x^3} - 4\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial x \partial y^2} = 2\sin(3x + 2y).$ (6)

(b) Solve $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = \cos 2x \cos 3y.$ (5)

Module – V

(21) A tightly stretched string with fixed end points $x = 0 \; and \; x = l$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest from this position, find the displacement $y(x, t)$. (10)

OR

(22) A tightly stretched string with fixed end points $x = 0 \; and \; x = l$ is initially at rest in its equilibrium position. If it is vibrating by giving to each of its points a velocity $\lambda x(l - x)$, find the displacement of the string at any distance x from one end at any time t. (10)

Module - VI

(23) A bar 10 cm long with insulated sides has its ends A and B maintained at 30^0c and 100^0 c respectively until steady state conditions prevail. The temperature at A is suddenly raised to 20^0 c and at the same time that of B is lowered to 40^0 C. Find the temperature distribution in the bar at time t. (10)

OR

(24) A rod of 30cm long has its ends A and B kept at 30^0 c and 90^0 c respectively until steady state temperature prevails. The temperature at each end is then suddenly reduced to zero temperature and kept so. Find the resulting temperature function $u(x, y)$ taking $x = 0$ at A. (10)

A

PART A
Answer all questions Each carries 3 marks

1. Find ordinary differential equation for the basis $e^{-x\sqrt{2}}$, $xe^{-x\sqrt{2}}$

2. Reduce $y'' = y'$ to 1st order differential equation and solve.

3. Find the particular solution to $(D^4 - m^4)\ y = \sin\ mx$

4. Use variation of parameters to solve $y'' + y = \sec x$

5. Find the Fourier coefficient a_n for the function $f(x) = 1 + |x|$ defined in $-3 < x < 3$

6. Develop the Fourier Sine series of $f(x) = x$ in $0 < x < \pi$

7. Obtain the partial differential equation by eliminating arbitrary function from $x^2 + y^2 + z^2 = f(xy)$

8. Solve $y^2 zp + x^2 zq = xy^2$

9. Solve $u_x + u_y = 0$ using method of separation of variables

10. A finite string of length L is fixed at both ends and is released from rest with a displacement $f(x)$. What are the initial and boundary conditions involved in this problem?

11. Write all the possible solutions of one-dimensional heat transfer equation

12. Find the steady state temperature distribution in a rod of length 30cm having the ends at 20^0 C and 80^0 C respectively.

PART B
Answer one full question from each module
Module -I

13. (a) Verify linear independence of $e^{-x}cosx$ and $e^{-x}sinx$ using Wronskian and hence solve the initial value problem $y'' + 2y' + 2y = 0$, $y(0) = 0$, $y'(0) = 15$

B

10001

Reg. No.:_____ Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: PH100

Course Name: ENGINEERING PHYSICS

Max. Marks: 100   Duration: 3 Hours

Part A

Answer ALL questions. Each question carries 2 marks

1. What do you mean by quality factor of an oscillator?
2. What is the relation between path difference and phase difference in wave motion?
3. Two independent sources of light cannot produce interference fringes. Why?
4. Define dispersive power of a grating.
5. Distinguish between plane polarized light and unpolarized light.
6. What is Meissner effect?
7. What is phase space?
8. What is the probability interpretation of wave function?
9. What is the relation connecting reverberation time and total absorption?
10. What is magnetostriction effect?
11. Write any two advantages of Hologram over photographic images.
12. Distinguish between Step index fibre and Graded index fibre.

Part B

Answer any 10 questions. Each question carries 4 marks

13. Compare an electrical and mechanical oscillator.
14. A transverse wave on a stretched string is described by $y(x, t) = 4.0 \sin (25t+0.016x+\pi/3)$ where x and y are in cm and t is in second.
    Obtain the (i) Speed (ii) Amplitude (iii) Frequency and (iv) Initial phase at the origin.
15. With Newton's rings arrangement, nth dark ring formed by light of wavelength 6000 A^0 coincides with the $(n+1)^{th}$ dark ring for light of wavelength 4500A^0. If the radius of curvature of the convex surface is 90 cm, find the diameter of the nth ring for light wavelength 6000 A^0.
16. A plane transmission grating has 6000 lines/cm. Find the angular separation between two wavelengths 500 nm and 510 nm in the 3rd order.

17. The refractive index of calcite is 1.658 for ordinary ray and it is 1.486 for extraordinary ray. A slice having thickness 0.9×10^{-4} cm is cut from the crystal. For what wavelengths this slice will act as a (i) Quarter wave plate. (ii)Half wave plate $t = \frac{\lambda}{4(\mu_o - \mu_e)}$

18. Distinguish between type I and type II super conductors with examples.

19. Calculate the de Broglie wavelength of electron whose kinetic energy is 10keV.

20. Distinguish between Macrostate and Microstate of a system

21. The volume of a hall is 3000m³. It has a total absorption of 100m² sabine. If the hall is filled with audience who add another 80m² sabine, then find the difference in reverberation time.

22. What is NDT? How ultrasonic wave is used for NDT.

23. What is the difference between Spontaneous emission and Stimulated emission?

24. What is a LED? Give its working principle.

Part-C
Answer any 3 questions. Each question carries 6 marks.

25. Considering the transverse vibration in a stretched string, derive the differential equation of one-dimensional wave.

26. Light from a monochromatic source is allowed to fall on a single slit. Two lenses are given. With the help of a neat diagram write the experimental set up for obtaining the diffraction pattern. Deduce the conditions for getting bright and dark regions on the screen. Also obtain the width of central maximum.

27. How a Nicol prism can be constructed from a calcite crystal? How can it be used as a polarizer and as an analyzer?

28. Formulate Schrodinger's time dependent equation starting from a plane wave equation by using de Broglie's formula and Einstein's relation for photon energy.

Part-D
Answer any 3 questions. Each question carries 6 marks.

29. With a neat diagram explain how ultrasonic waves are produced by piezoelectric oscillator

30. What are the factors affecting the acoustics of a building?

31. Outline the principle and working of Ruby Laser.

32. Define numerical aperture of an optical fibre and derive an expression for NA of a step index fibre.

10051

B

Reg. No. : ....   Name : ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016
PH 100 : ENGINEERING PHYSICS

Max. Marks : 100   Duration : 3 Hours

PART – A

Answer **all** questions. **Each** question carries **2** marks.

1. Distinguish between free oscillation and damped oscillation.

2. State the laws of transverse vibrations of a stretched string.

3. What do you mean by optical path ?

4. What is grating element ? Write the grating equation in terms of grating element.

5. What is a Retardation plate ? Write the expression for the thickness of a QWP and HWP.

6. What is DC Josephson effect ?

7. How do you account for the natural line broadening on the basis of Heisenberg's Uncertainty principle ?

8. What do you mean by Fermi energy level and Fermi energy ?

9. Distinguish between reverberation and echo.

10. How ultrasonic waves are detected by thermal method ?

11. How population inversion is achieved in Ruby laser ?

12. Explain the principle of propagation of light through an optical fibre.   **(12×2=24)**

P.T.O.

PART – B

Answer **any 10** questions. **Each** question carries **4** marks.

13. What are the conditions for oscillations of a harmonic oscillator to be over damped, critically damped and under damped ? Compare the time – displacement curve in the three cases.

14. A piece of wire 50 cm long is stretched by a load of 2.5 kg and has a mass of 1.44 g. Find the frequency of the second harmonic.

15. Light of wave length 6000 Å falls normally on two glass plates enclosing a wedge shaped film. The plates touch at one end and are separated at 10 cm from that end by a wire. If the bandwidth of the interference pattern is 0.05 mm, find the diameter of the wire.

16. Light of wave length 589.3 nm is incident normally on a plane transmission grating having 6000 lines/cm. Calculate the angle at which the principal maxima of the first order is formed.

17. How do you distinguish circularly polarized light from un polarized light ?

18. Write any four applications of superconductors.

19. What are the conditions to be satisfied by a wave function ?

20. What is phase space ? With the help of Heisenberg's Uncertainty relation, show that the minimum size of the unit cell in quantum statistics is hf, where h is the Planck's constant and f is the degree of freedom of the system.

21. The dimensions of an auditorium are 60 m × 15 m × 10 m and its interior surfaces have an average absorption co-efficient of 0.25. Find the reverberation time of the auditorium.

22. Given that the velocity of ultrasonic waves in sea water is equal to 1440 m/s. Find the depth of a submerged submarine, if ultrasonic pulses reflected from the submarine is received 0.33 s after sending ultrasonic waves.

23. With the help of a neat diagram explain how a hologram is recorded.

24. A fibre cable has an acceptance angle of 30° and a core of refractive index 1.4. Calculate the refractive index of the cladding.   **(10×4= 40)**

PART – C

Answer **any 3** questions. **Each** question carries **6** marks.

25. Write the differential equation of a forced harmonic oscillator and write its solution. Derive the expression for the amplitude and phase difference in terms of the natural frequency of the body and frequency of applied periodic force.

26. Derive the expression for the diameter of the nth dark ring in Newton's ring interference pattern. With necessary equations explain briefly the experimental procedure to determine the refractive index of a liquid.

27. With the help of a neat diagram of the principal section of a nicol prism write how it produces plane polarized light and how it can be used for the analysis of plane polarized light ?

28. Compare M-B, B-E and F-D statistics. **(3×6=18)**

Answer **any 3** questions. **Each** question carries **6** marks.

29. What are ultrasonic waves ? Write the principle of production of ultrasonic waves by magnetostriction effect. Draw the circuit diagram of the magnetostriction oscillator. Write any two applications of ultrasonic waves.

30. Define intensity of sound wave. Write the expression for the SIL in dB scale. Distinguish between threshold minimum intensity and threshold pain intensity.

31. "Lasing medium with metastable state, optical resonator, and pumping mechanism are the essential requirements of a laser". How it is satisfied in He-Ne laser ?

32. With a block diagram explain fibre optic communication system. **(3×6 =18)**

B

10003

Reg. No._____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2016

PH100 ENGINEERING PHYSICS

Max. Marks: 100   Duration: 3 Hours

Part-A

Answer all questions. Each question carries 2 marks.

1. What is the effect of damping on the frequency and time period of an oscillator?
2. Distinguish between longitudinal waves and transverse waves.
3. Write the expression for the radius of the nth dark ring in Newton's rings interference pattern. What happens to this radius when air is replaced by a liquid of refractive index μ.
4. Define resolving power of grating.
5. What is a half wave plate? Write the expression for its thickness.
6. What is DC Josephson effect?
7. What is quantum mechanical tunnelling?
8. What do you mean by Fermi level of a system?
9. Define absorption co-efficient of sound.
10. What is piezo electric effect?
11. What is metastable state. How it is significant in the production of laser?
12. What is a phototransistor?

Part-B

Answer any 10 questions. Each question carries 4 marks

13. What is the condition for over damping in the case of a damped harmonic oscillator? With the help of displacement-time graph write how this condition affect the amplitude of the oscillator?
14. A string when stretched by a weight of 4kg gives a note of frequency 256 Hz. What weight will produce a frequency twice the above frequency?
15. What is an interference filter? How is it constructed?
16. A parallel beam of monochromatic light falling normally on a diffraction grating produces a deviation of $14^0 43^1$ in the second order. If the grating has 5200 lines/cm calculate the wavelength of the monochromatic radiation.
17. A plane polarized light of $\lambda=6000\text{Å}$ is incident on a quartz crystal and parallel to the axis. If the refractive indices of the crystal for ordinary and extraordinary ray are 1.544

and 1.553, then find the least thickness for which the ordinary and extraordinary rays combines and emerge as plane polarized light.

18. What is Meissner effect? Show that a super conductor is a perfect diamagnet.
19. The time gap between the excitation of an atom and emission of radiation is $\Delta t = 10^{-8}$ second. Find the uncertainty in the frequency of radiation.
20. Write three important postulates of Fermi-Dirac Statistics. Also write its distribution equation.
21. A cinema hall has a volume of 10000 m^3. It is required to have a reverberation time of 2 seconds. What should be the total absorption of the hall?
22. Calculate the frequency of ultrasonic waves that can be generated by a nickel rod of length 4cm. (Young's modulus of nickel = 207 GPa and density of nickel 8900 kg/m^3).
23. Calculate the ratio of spontaneous to stimulated emission by an incandescent bulb at 2000 K. Take frequency = 6 x 10^{14} Hz. Boltzmann Constant k = 1.38×10^{-23} J/K.
24. What are Fibre optic sensors? Name two different types.
25.

Part-C

Answer any 3 questions. Each question carries 6 marks.

26. Frame and solve the differential equation of a forced harmonic oscillator.
27. With necessary theory write the formation of interference pattern in an air wedge and derive an expression for the bandwidth.
28. You are provided with two nicols and a quarter wave plate. How will you produce plane polarized, circularly polarized and elliptically polarized light.
29. State Uncertainty principle. With the help of it, explain the absence of electrons inside the nucleus.

Answer any 3 questions. Each question carries 6 marks.

30. Name and explain two methods for the detection of ultrasonic waves. Name any four medical applications of ultrasonic waves.
31. What is reverberation and reverberation time? What is its significance? Write the factors on which the reverberation time depends. Write Sabine's formula.
32. Outline the principle and working of He-Ne laser.
33. What is the principle of holography? How is a hologram recorded? Write any two applications of holography.

**

B

10005

Reg. No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, AUGUST 2016

PH100 ENGINEERING PHYSICS

Max. Marks: 100   Duration: 3 Hours

Part-A

Answer all questions. Each question carries 2 marks.

1.   What is a forced oscillator?

2.   What are the factors on which the frequency of vibration of a stretched string depends?

3.   Write the principle of superposition of waves.

4.   What is grating element. How it is related with the number of lines drawn per unit length of the grating.

5.   What is double refraction?

6.   What is Meissner effect?

7.   Write the normalization condition of a wave function and its significance.

8.   What is the minimum size of a cell in phase space in Quantum Statistics? What is the probability of occupancy for the Femi level at non zero absolute temperature?

9.   The absorption co- efficient of open window is one. Justify the statement.

10. Mention any four applications of ultrasonic waves.

11. Name four outstanding characteristics of Laser.

12. Name the two different types of fibre optic sensors.

Part-B

Answer any 10 questions. Each question carries 4 marks

13. Compare electrical and mechanical oscillating systems.

14. Equation of transverse wave travelling along a string is $y = 4\sin \pi(0.010x - 2.0t)$ where x and y are in centimetres and t is in second. Find (i)Amplitude (ii)Wavelength (iii)Initial phase at the origin and (iv)Frequency of the wave

15. With the help of Cosine law, how can you account for the colours of thin films?

16. What is the highest order of spectrum which may be seen with light of wavelength 5×10^{-5}cm by means of grating with 3000 lines/cm.

17. Calculate the thickness of a doubly refracting crystal required to introduce a path difference of $\lambda/2$ between the ordinary and extra ordinary rays. Given $\lambda=6000$ A^0, $\mu_0=1.544$, $\mu_e=1.5533$.

18. What is super conductivity? Define transition temperature and critical magnetic field.

19. What is the significance of operators in Quantum mechanics? What is Hamiltonian operator? Write its expression.

20. Write any four assumptions of Maxwell - Boltzmann Statistics.

21. Calculate the reverberation time of a hall having volume 4000m^3 and total sound absorption of 160 m^2 sabine.

22. An ultrasonic source of 0.09 MHz sends down a pulse towards the sea bed which returns after 0.55 second. The velocity of sound in water is 1800 m/s. Calculate the depth of the sea and wave length of the pulse.

23. What is population inversion? How it can be achieved?

24. Name the principle behind the propagation of light through an optic fibre. How the essential conditions for this phenomenon is satisfied in optic fibres. List three advantages of fibre optic communication.

Part-C
Answer any 3 questions. Each question carries 6 marks

25. Derive one-dimensional wave equation and write its solution.

26. With the help of a diagram, deduce the conditions for darkness and brightness in the case of Fraunhofer diffraction at a single slit. Obtain the width of central maximum.

27. How a Nicol prism can be constructed from a calcite crystal. How can it be used as a polarizer and analyzer?

28. Write the Schrodinger equation for a particle in one dimensional infinite square well potential and derive the normalized wave function.

Answer any 3 questions. Each question carries 6 marks.

29. How can you produce ultrasonic waves using piezoelectric oscillator.

30. Explain the factors affecting the acoustics of a building.

31. "Laser is light amplification by stimulated emission of radiation." Define the terms absorption, spontaneous emission and stimulated emission. Derive the relation between Einstein coefficients.

32. What is a hologram? How can it be re- constructed? Write any 2 advantages of holograms over photographic images.

10007　　　　　　　　　　　　　　　　　　　　　　　　　　　**B**

Reg. No.:_____　　　Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: CY100

Course Name: ENGINEERING CHEMISTRY

Max. Marks: 100　　　　　　　　　　　　　　　　Duration: 3 Hours

Part A

Answer all questions, each question carries 2 marks

1. The absorbance of a 0.01M dye solution in ethanol is 0.62 in a 2cm cell for light of wavelength 5000 A^0. If the path length of light through the sample is doubled and the concentration is made half, what will be the value of absorbance?
2. A zinc wire is dipped in silver nitrate solution taken in beaker A and a silver wire is dipped in zinc sulphate solution taken in beaker B. Predict in which beaker the ions present will get reduced. Given that the standard reduction potential of zinc and silver are -0.76V and 0.80V respectively.
3. Write the essential components of gas chromatography equipment.
4. What is poly aniline? Give its structure and two applications.
5. What is cetane number?
6. Write two examples of solid lubricants. Compare their structure.
7. Hard water does not produce much lather with soaps or detergents. Give reason.
8. Write the significance of BOD.

　　　　　　　　　　　　　　　　　　　　　　　　(8 x 2 = 16 Marks)

Part B

Answer all questions, each question carries 3 marks

9. Write three points of comparison between UV and IR spectrum.
10. Write three advantages of hydrogen - oxygen fuel cell.
11. Define the term cell constant. The specific conductivity of a 0.3N KCl solution at 27^0C is 0.028 S cm^{-1}. Resistance of the cell containing this solution is 300 ohms. Determine cell constant.
12. What is the nature of bonding in carbon nanotubes? Write two applications of carbon nanotubes (CNTs).
13. Write the composition and uses of natural gas.
14. What is viscosity index (V.I)? Oils having high viscosity need not necessarily have high V.I Comment.
15. Give three points of difference between aerobic oxidation and anaerobic oxidation.
16. What are ion exchange resins? Give examples for cation and anion exchange resins.

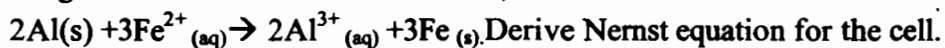　　　　　　　　　　　　　　　　　　　　　　　　(8 x 3 = 24 Marks)

Part C

Each question carries 10 marks

17. (a) Why does a signal for a particular set of protons split into a multiplet? Give number of signals, peak ratio and multiplicity of different sets of protons in the NMR spectrum of 1-bromopropane.

    (b) Give a neat and labelled sketch of instrumentation of UV-visible spectrometer.

    (c) Write a note on vibrational modes of carbon dioxide molecule. State which of these modes are IR active; andgive reason for their activity.   (4+3+3)

OR

18. (a) What is chemical shift? Write the cause of chemical shift.

    (b) CO molecule absorbs at $2140 cm^{-1}$. Calculate the force constant of the molecule, given atomic masses of C and O are 12u and 16 u respectively $1u = 1.67 \times 10^{-27} kg$.

    (c) What are the various energy transitions possible in a molecule? Why does electronic spectrum appear broad?   (4+3+3)

19. (a) Design a reversible cell for the reaction;

    $2Al(s) + 3Fe^{2+}_{(aq)} \rightarrow 2Al^{3+}_{(aq)} + 3Fe_{(s)}$. Derive Nernst equation for the cell.

    (b)Explain the variation of emf of Daniel cell with respect to temperature and concentration.

                    (5+5)

OR

20. (a)Draw a well labelled diagram of calomel electrode. Write electrode reaction and representation of the electrode.

    (b) Find the potential of hydrogen electrode at $25^{\circ}C$ for solution of pH=0 and pH=14

    (c)Why Aluminium metal when reacts with acid and base liberates H_2 gas; whereas Fe metal can liberate H_2 only from acids. $E^0 Al^{3+}/Al = -1.66V$ and $E^0 Fe^{2+}/Fe = -0.44V$

                    (4+3+3)

21. (a)Explain the principle and instrumentation of HPLC.

    (b)Differentiate between DTA thermogramand TGAthermogram graphically.   Give one important application of each type.   (5+5)

OR

22. (a)Give a comparison of GSC and GLC.

    (b)Write the working of TLC. List the important applications.   (5+5)

23. (a)Give the classification of conducting polymers and write the mechanism of conduction in them.

    (b)Write structural formulae and important uses of the polymers Kevlar and ABS.

                    (6+4)

2

24. (a) Write the preparation and important properties of silicone rubber.

(b) Write the sol- gel method for the synthesis of nanomaterials. (5+5)

25. (a) What are greases? Write a brief note on their classification.

(b)The temperature of 1000g of water was increased from $26.5°C$ to $29.2°C$ on burning 0.80g of a solid fuel in a bomb calorimeter. Water equivalent of calorimeter and latent heat of steam are 385 g and 587 cal/g respectively. If fuel contains 0.7% hydrogen calculate its gross and net calorific value. (6+4)

OR

26. (a)Calculate the net and gross calorific value of a coal sample having following composition:C=82%, H=8%, O=5%, N=1.4% and ash=3.6 %.

(b) Define the properties of a liquid lubricant which are useful for their evaluation under the following conditions (i) fire hazards (ii) very low temperature.

(c)What is biodiesel? List its environmental advantages. (4+3+3)

27. (a) Give the theory of EDTA method for estimating the hardness of water.

(b) 2.8g of $CaCO_3$ was dissolved in HCl and the solution diluted to one litre. 100 mL of this solution required 28 mL of EDTA solution, while 100 ml of the hard water required 35 mL of the same EDTA solution. On the otherhand 100 mL of the boiled sample water when titrated against EDTA required 10 mL of EDTA solution. Calculate the temporary and permanent hardness of water? (4+6)

OR

28. (a)With the help of a neat diagram outline the reverse osmosis process.

(b)A sample of water is found to contain 48.6 mg/L $Ca(HCO_3)_2$, 43.8 mg/L $Mg(HCO_3)_2$, 24.0 mg/L $MgSO_4$, 27.2 mg/L $CaSO_4$ and 16.8 mg/L $NaHCO_3$. Calculate the carbonate and non-carbonate hardness of water. (5 +5)

(6x10=60 marks)

10009

█████████████

B

Reg. No. : ....   Name : ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016
Course Code : CY100
Course Name : ENGINEERING CHEMISTRY

Max. Marks : 100   Duration : 3 Hours

PART – A

Answer **all** questions, **each** question carries **2** marks.

1. Which of the following nuclei can give NMR spectrum ? Give reason.

    a) ^1_1H b) $^{12}_6C$ c) $^{19}_9F$ d) $^{16}_8O$

2. At 25°C the standard emf of a cell having reaction involving two electron charge is found to be 0.295 V. Calculate the equilibrium constant of the reaction.

3. The specific conductivity of N/50 KCl solution at 25°C is 0.0002765 ohm^{-1} cm^{-1}. If the resistance of the cell containing this solution is 500 ohm, what is the cell constant ?

4. What are co-polymers ? Give an example.

5. Distinguish between gross and net calorific values of fuel.

6. What is meant by cetane value of a diesel fuel ?

7. Hard water will not give a ready lather with soap solution. Give the chemical explanation.

8. Why do we express hardness of water in terms of $CaCO_3$ equivalent ?

(8×2=16 Marks)

PART – B

Answer **all** questions, **each** question carries **3** marks.

9. The vibrational frequency of HCl molecule is 2886cm^{-1}. Calculate the force constant of the molecule. Reduced mass of HCl is 1.63×10^{-27} kg.

P.T.O.

10. What is meant by potentiometric titrations ? Mention two merits of potentiometric titrations.

11. Give the principle of column chromatography. List the various steps to be undertaken in this method.

12. Draw the structure of bifunctional silicon chloride. How silicone rubber prepared from it ?

13. An oil of unknown viscosity-index has a Saybolt universal viscosity of 58 seconds at 210°F and of 580 seconds at 100°F. The high viscosity index standard (Pennsylvanian) oil has Saybolt viscosity of 58 seconds at 210°F and 430 seconds at 100°F. The low viscosity index standard (Gulf oil) has a Saybolt universal viscosity of 58 seconds at 210°F and 780 seconds at 100°F. Calculate the viscosity index of oil sample.

14. What is natural gas ? Distinguish between LNG and CNG.

15. What is disinfection ? Give the advantages and disadvantages of UV disinfection of water.

16. A sample of water on analysis gives following results. $Ca^{2+} = 320$ mg/L, $Mg^{2+} = 72$ mg/L, $HCO_3^- = 610$ mg/L, $Cl^- = 355$ mg/L and $Na^+ = 23$ mg/L. Calculate the temporary and permanent hardness of water sample. **(8×3=24 Marks)**

PART – C

Each question carries **10** marks.

17. a) How can you distinguish NMR spectrum of CH_3CH_2Cl and CH_3CHCl_2 applying the concept of spin-spin splitting ?

    b) Which of the following molecules show UV-visible absorption ? Give reason (i) ethane (ii) butadiene (iii) benzene (iv) phenol

    c) What is a spectrometer ? Write the principal components of UV-visible spectrometer.   **(3+3+4)**

OR

18. a) Predict NMR spectrum of $CH_3 - CHCl - CH_3$.

    b) Write the theory of vibrational spectroscopy.

    c) Sketch the various modes of vibrations possible for CO_2. Which are IR active ? Write reason for your answer.   **(3+2+5)**

19. a) What is meant by standard electrode potential ? How would you measure the single electrode potential of an electrode using a saturated calomel electrode ?

    b) Find the single electrode potential for copper metal in contact with 0.1 M Cu^{2+} solution at 298 K. E^0 Cu^{2+}/Cu = 0.34 V

    c) How is glass electrode constructed ? What is its use ?   **(4+2+4)**

<center>OR</center>

20. a) Write electrode reaction and expression for the electrode potential of following electrodes :

      i) Metal-metal ion electrode

      ii) Gas electrode

      iii) Metal-metal insoluble salt electrode

      iv) Redox electrode.

    b) How will you explain the working of $H_2 - O_2$ fuel cell ? Draw a neat labelled diagram of the cell.   **(4+6)**

21. a) What is thermal analysis ? List two techniques of it. Compare their principles.

    b) Write the basic components of a gas chromatographic instrument. Draw the diagram of a gas chromatograph.   **(6+4)**

<center>OR</center>

22. a) Write the procedure for doing column chromatography.

    b) What is HPLC ? Draw a labelled diagram of HPLC instrument. Write its two important applications.   **(5+5)**

23. a) What are conducting polymers ? Write the structure of two conducting polymers.

    b) Write a note on structure and applications of fullerene.

    c) Write a note on biological nanomaterials.   **(3+4+3)**

<center>OR</center>

24. a) What are carbon nanotubes ? How are they classified ? State their two applications.

    b) Write the structure and two applications of Kevlar.   **(6+4)**

10009

25. a) Differentiate between vegetable oil and mineral oil lubricants.
    b) Write the working of a Bomb calorimeter for determining the calorific value of a solid fuel with the help of a neat diagram. **(3+7)**

<div align="center">OR</div>

26. a) What are lubricants ? How are they classified on the basis of their physical state ? What are their important functions ?
    b) Write any four desirable properties of a lubricant and indicate the significance of the properties. **(5+5)**

27. a) What is the main purpose of secondary sewage water treatment ? Explain trickling filter process.
    b) What is desalination ? How is it performed by reverse process ? **(5+5)**

<div align="center">OR</div>

28. a) How is UASB process useful in waste water treatment ?
    b) What are the factors which governs the amount of dissolved oxygen in water ? **(5+5)**

———————

B

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2016
Course Code: CY100
Course Name: ENGINEERING CHEMISTRY

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each question carries 2 marks

1. Which of the following molecule can give an IR spectrum? Give reason. (a)H_2 (b) N_2 (c) HCl (d) Cl_2

2. What are redox electrodes? Indicate the electrode reaction and electrode potential with a suitable example.

3. Distinguish between the terms conductance and specific conductance.

4. What is Kevlar? Mention its two important properties.

5. Differentiate between HCV and LCV.

6. How does graphite acts as a lubricant?

7. In the deionisation process water is first passed through cation exchanger and then through anion exchanger. Why?

8. A water sample contains 204 mg of $CaSO_4$ per litre. Calculate the hardness in terms of $CaCO_3$ equivalent?

PART B
Answer all questions, each question carries 3 marks

9. Derive Beer-Lambert's law.

10. Write the origin of electrode potential. Electrode potential of zinc is assigned a negative value, whereas that of copper a positive value. Give reason.

11. What do you mean by R_f value in chromatography? Give the use of the term in the technique.

12. Give the structure and any two properties of ABS.

13. What are the advantages of liquid fuels over solid fuels?

14. What is the significance of viscosity index of a lubricant? How can you calculate it?

15. How BOD differs from COD?

16. What do you understand by hardness of water? Distinguish between temporary and permanent hardness of water.

17. (a) State the principle of vibrational (IR) spectroscopy. Arrange the following bonds in the order of increasing stretching frequencies C-C, C=C and C≡C. Write suitable explanation for your answer. (5)

(b) What is spin-spin splitting? Write the splitting pattern in the NMR spectrum of $CH_2Cl-CH_2-CH_2Cl$. (3)

(c) Write two important applications of electronic spectroscopy. (2)

OR

18. (a) Explain the principle of NMR spectroscopy. Which of the following nuclei can have a presence in NMR spectrum? (i) $^{16}_{8}O$ (ii) $^{13}_{6}C$ (iii) $^{2}_{1}H$. Reason for your answer. (4)

(b) Define chemical shift. Interpret the number of signals, the position of signals and the intensity of signals in the NMR spectrum of $CH_3CH_2CH_2Cl$. (4)

(c) Most absorption bands in the electronic spectra are very broad. Give reason. (2)

19. (a) How is a calomel electrode constructed? Sketch the electrode. (4)

(b) Give the working principle of H_2-O_2 fuel cell with cell reactions. (4)

(c) A hydrogen electrode at 25°C is immersed in a solution of pH 2.5 and coupled with the half-cell SHE. Calculate the emf of the cell. (2)

OR

20. (a) How does a lithium–ion cell work? Write the cell reactions. (4)

(b) Calculate the emf of the following cell at 25 °C;

$Zn \mid Zn^{2+}(a= 0.0004) \parallel Cd^{2+}(a=0.2) \mid Cd$;

Given $E^0 Zn^{2+} \mid Zn = -0.76$ V ; $E^0 Cd^{2+} \mid Cd = -0.403$ V (3)

(c) Give the principle of acid-base titration by potentiometry. (3)

21. (a) Draw the block diagram of TGA apparatus. (4)

(b) State the principle and applications of GC. (4)

(c) Write the demerits of TGA. (2)

OR

22. (a) What is the basic principle of thermo gravimetric analysis? List its important applications.

(b) Write experimental arrangement and procedure for measuring conductance of an electrolytic solution. (3+4+3)

(c) List important applications of TLC.

23. (a) How is polyaniline synthesised? Mention two applications of polyaniline.

(b) Write a note on OLED.

(c) What is silicone rubber? List two important propertiesof silicone rubber. $(4+3+3)$

OR

24. (a) What are carbon nanotubes?

(b) Write the characteristic properties of carbon nano tubes.

(c) What are fullerenes? List two applications of fullerenes. $(4+3+3)$

25. (a) 0.72g of a fuel containing 80% C, when burnt in a bomb calorimeter increased the temperature of water from 27.3 to 29.1°C. If the calorimeter contains 250g of water and its water equivalent is 150g, calculate the HCV of the fuel.

(b) Write a method of preparation of biodiesel .What are its merits and demerits?

(c) Distinguish between flash and fire points, write the significance of the terms in the selection of a lubricant. $(3+3+4)$

OR

26. (a) What do you mean by a lubricant? Write its functions.

(b)Calculate gross and net calorific value of a fuel having following composition82% C, 8% H, 5% O, 2.5% S, 1.4%N and 2.1% ash.

(c) What is knocking? Mention disadvantages of knocking. $(3+4+3)$

27. (a)How is reverse osmosis process applied in the desalination of brackish water? Mention the advantages of the process.

(b) What is the principle of EDTA method? 0.30 g of $CaCO_3$ was dissolved in HCl and the solution was made to one litre with distilled water. 100 mL of the above solution required 30 mL of EDTA solution. 100 mL of hard water required 33mL of the EDTA solution on titration. After boiling 100 mL of this water required 10 mL of EDTA solution. Calculate temporary and permanent hardness of water. $(5+5)$

OR

28. (a) How is UASB process useful in waste water treatment?

(b)What are the factors which govern the amount of dissolved oxygen in water?

(c) A sample of water is found to contain 16.2mg/L calcium bicarbonate, 7.3mg/L magnesium bicarbonate, 9.5mg/L magnesium chloride, and 13.6mg/L calcium sulphate. Calculate temporary and permanent hardness? What happen to the temporary and permanent hardness of the water sample if 10.6mg/L Na_2CO_3 is added? $(4+3+3)$

3

B

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST/SECOND SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, AUGUST 2016

Course Code: CY100

Course Name: ENGINEERING CHEMISTRY

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each question carries 2 marks

1. How many modes of vibrations are there in water molecule? State weather all are IR active?

2. Calculate the amount of electrical energy available from a dry cell corresponding to the consumption of 6.55g zinc metal (cell emf= 1.5V ,atomic wt. of Zn = 65.5)

3. Differentiate between the terms retention time and retention factor used in chromatography.

4. Write down the structures of BS and Kevlar.

5. Lubricants with higher aniline point are desirable. Why?

6. What is natural gas? Give its approximate composition.

7. What is the role of NH_3-NH_4Cl buffer solution in the determination of hardness of water by EDTA method?

8. The dissolved oxygen content of a sample of water is low. What comments you can make about the water quality?

PART B
Answer all questions, each question carries 3 marks

9. Why is TMS taken as reference to determine chemical shift value in NMR spectroscopy?

10. Draw a well labelled diagram of calomel electrode. Write down the electrode representation.

11. What are the methods used for visualisation of spots in TLC?

12. Carbon nano materials are promising materials in electronics and reinforcing field. Justify the statement.

13. A sample of fuel was found to have the following percentage composition.C-72%, H-8.2%, O-12%, N-3.3% and ash 4.5%. Calculate HCV and LCV of coal sample.

14. What is biodiesel? Write any three advantages of the fuel.

15. Why chloramine is a better disinfectant than chlorine?

16. Write a note on sewage water treatment by USAB process.

PART C
Each question carries 10 marks

17. (a) Write the mathematical representation of the law governing absorption of light by molecules of a solution. A dye solution of concentration 0.05M shows an absorbance of 0.055 at 540nm while a test solution of the same has an absorbance of 0.025 under same conditions. Calculate concentration of test solution.

(b) What is meant by the term shielding in NMR spectroscopy? Arrange the CH_3F, CH_3Cl, CH_3Br and CH_3I in the increasing order of shielding effect. Give the reason for your answer.

(c) Give the reason for high δ-value of aromatic protons. (3+3+4)

OR

18. (a) Define IR spectrum. Why HCl is IR active, but hydrogen molecule is not. Write the reason for the statement.

(b) What is meant by spin-spin coupling in NMR spectroscopy? Predict the different types of protons, the number of signals and the ratio of area of peaks in the NMR spectrum of CH_3-O-CH_2-CH_3

(c) What is MRI? How is it useful in the field of medicine? (3+4+3)

19. (a) Write the half-cell reactions when a Li - ion cell acts as an electrolytic cell.

(b) Sketch the electrochemical cell, write the cell reactions of the following cell: Cd(s) | $CdSO_4$(0.01M) || $CuSO_4$(0.5M) |Cu(s). Calculate the emf of the cell at 25 °C if the E^0 cell is 0.38V.

(c) What are the functions of a salt bridge? (4+3+3)

OR

20. (a) Write the construction and working of a hydrogen oxygen fuel cell.

(b) A hydrogen electrode is immersed in a solution of pH 4.9 and is coupled withSHE. Calculate the emf of the cell? (7+3)

21. (a) What is HPLC? Give its principle.

(b) Give a well labelled diagram of HPLC.

(c) List two applications of HPLC.

(d) How does HPLC differ from GC? (3+3+2+2)

OR

22. (a) Give the principle of DTA.

(b) Give a neat labelled diagram of DTA apparatus.

(c) List applications of DTA. (3+3+4)

23. (a) What are nano materials? How are they classified based on dimension? Give one example for each type.

(b) Write the main difference between intrinsically conducting polymers and extrinsically conducting polymers. List two advantages of using conducting polymers instead of metals.

(4+6)

OR

24. (a) What are conducting polymers? Write the structure of two conducting polymers with their respective monomers.

(b) What is OLED? Give an example.

(c) Write three advantages of OLED display? (4+3+3)

25. (a) Distinguish between (i)cloud point and pour point and (ii) flash point and fire point. Write the significance of these terms of lubricating oil.

(b)Write the working of a Bomb calorimeter for the determination of calorific value of a solid fuel with a neat diagram. (5+5)

OR

26. (a) Write a note on liquid lubricants.

(b) Differentiate between oil dag and aquadag? Mention their applications.

(c) What is meant by knocking of petrol? Arrange the following compounds benzene, n-hexane and cyclohexane in the increasing order of knocking tendency. Reason your answer.

(4+3+3)

27. (a) Water for use in a hospital has to be disinfected. An ozone plant and a chlorination plant are under consideration. What are the advantages and disadvantages of the suggested methods?

(b) Calculate the temporary and permanent hardness of a sample of water containing $Mg(HCO_3)_2$-10mg/L, $Ca(HCO_3)_2$-10mg/L, $CaSO_4$-12mg/L and $MgSO_4$-14mg/L

(c) Correlate COD and BOD. Give the significance of BOD in water analysis. (4+3+3)

OR

28. (a)Name the indicator used in EDTA titration for estimation of hardness of water. How does it act?

(b) An advertisement of a water purifier mentions that it uses an ion exchange resin capsule, activated carbon and UV light for purification of water. How does each of these help in the purification of water?

(c) 25 mL of standard hard water containing 1 mg of pure $CaCO_3$per mL consumed 10 mL of EDTA. 25ml of water sample consumed 12.5 ml of the same EDTA solution. Calculate the total hardness of water sample in ppm. (3+3+4)

3

Reg. No.:_____ Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE 100

Course Name: ENGINEERING MECHANICS

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 5 marks

1. What are the laws of mechanics? State and explain them.

2. Find the support reactions of a cantilever beam of span 6m carrying a UDL of 6kN/m.

3. Explain moment of inertia and polar moment of inertia

4. Explain laws of friction.

5. Two equal weights 'W' are connected by a light (weightless) string passing over a frictionless pulley. A small weight 'w' is added to one side, as shown in figure, causing that the weight to fall. Determine the acceleration of the system assuming that the weights start from rest.

6. Explain instantaneous Centre of rotation.

7. Explain the terms free vibration and forced vibration

8. A body is vibrating with simple harmonic motion of amplitude 120mm and frequency 5cps. Calculate the maximum velocity and acceleration of the body.

PART B

Answer any 2 complete questions each having 10 marks

9. Block P = 5kg and block Q of mass m kg are suspended through a chord, which is in equilibrium as shown in the figure. Determine the mass of block Q.

10. Two homogeneous spherical balls rest between two vertical walls as shown in figure. The radius of smaller ball is 16 cm and weight is 1.15 kN. The radius of the larger ball is 24 cm and its weight is 3.45 kN. The distance between the walls is 72cm. Assuming the contact surfaces to be smooth, (a) Draw the free body diagram of two balls (b) Determine the reactions at A, B and C.

11. Determine the reactions at the supports A and B of the beam loaded as shown in figure below.

Answer any 2 complete questions each having 10 marks

12. Determine the support reactions of the beam shown in figure

13. Calculate the centroid of the composite area shown in figure:

14. Two identical block, A and B of weight W are supported by a rigid bar inclined 45° with horizontal as shown in figure. If both the blocks are in limiting equilibrium find the

2

coefficient of friction, between the block and wall assuming it to be same.

Answer any 2 complete questions each having 10 marks

15. A lift has an upward acceleration of 1.2 m/s². (a) What force will a man weighting 750 N exerts on the floor of the lift? (b)What force would he exert, if the lift had an acceleration of 1.2 m/s² downwards?(c) What upward acceleration would cause his weight to exert a force of 900 N in the floor?

16. In a reciprocating engine mechanism the crank rotates at a uniform speed of 400rpm. The length of crank and connecting rod are 150mm and 600mm respectively. Find (a) the angular velocity of the connecting rod (b) the velocity of piston when the crank makes an angle of 250 with horizontal.

17. A body of mass 50 kg is suspended by two springs of stiffness 4 kN/m and 6kN/m as shown in figure. The body is pulled 50mm down from its equilibrium position and then released. Find (a) the frequency of oscillation (b) maximum velocity (c) maximum acceleration.

3

10033

C

Reg. No. : ....   Name : ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016
BE 100 : ENGINEERING MECHANICS

Max. Marks : 100   Duration : 3 Hours

PART – A

Answer **all** the questions. **Each** question carries **5** Marks.   **(8x5=40 Marks)**

1. Explain the principle of transmissibility with an example.

2. Three smooth identical spheres A, B and C are placed in a rectangular channel as shown in Fig. 1. Draw the free body diagram of each sphere.

Fig. 1

3. State and prove Parallel axis theorem.

4. Define angle of friction and angle of repose. Prove that angle of repose is equal to angle of friction.

5. A lift carries a weight of 3600 N and is moving with a uniform acceleration of 3.5 m/s^2. Determine the tension in the supporting cable when the lift is moving upward. (g = 9.8m/s^2).

6. What do you mean by instantaneous centre of rotation? How can it be located for a body moving with combined motion of rotation and translation ?

P.T.O.

7. Distinguish between Simple Harmonic Motion and Periodic motion.

8. Explain the types of vibrations.

PART – B

Answer **two** questions from **each** set :

SET 1 : Answer **any 2** questions. **Each** question carries **10** Marks.   (2×10=20 Marks)

9. Determine the magnitude and direction of the resultant of the forces acting on the ring as shown in Fig. 2.

Fig. 2

10. Two smooth circular cylinders each of weight 100 N and radius 15 cm are connected at their centres by a string AB of length 40 cm and rest upon a horizontal plane as shown in below Fig. 3. The cylinder above them has a weight 200 N and radius of 15 cm. Find the force in the string AB and the pressure produced in the floor at the points of contact D and E.

Fig. 3

11. A 5 m bar of negligible weight rests in a horizontal position on the smooth planes as shown in above Fig. 4. Determine the load P and reactions at supports.

Fig. 4

SET 2 : Answer **any 2** questions. **Each** question carries **10 Marks. (2×10 = 20 Marks)**

12. a) Define radius of gyration.

b) Find the Centre of Gravity for the un-shaded composite area shown in Fig.5.

All dimensions in mm

Fig. 5

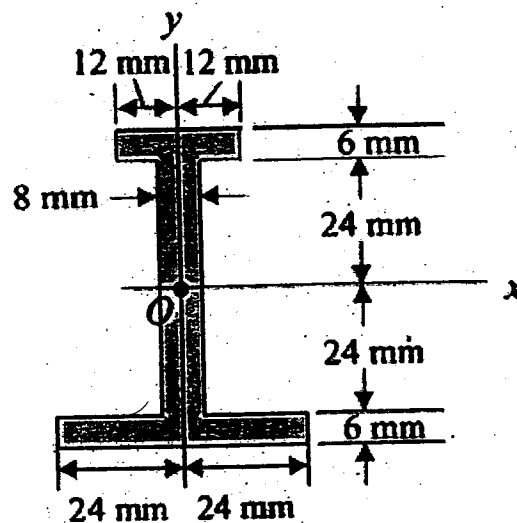13. Determine the moments of inertia of the shaded area (Fig. 6) with respect to the x and y axes.

Fig. 6

14. A uniform ladder of 4 m length rests against a vertical wall with which it makes an angle of 45°. The coefficient of friction between ladder and the wall is 0.4 and that between ladder and the floor is 0.5. If a man whose weight is one half that of ladder climbs up then how high will it be when the ladder slips ?

SET 3 : Answer **any 2** questions. **Each** question carries **10 Marks.** **(2×10=20 Marks)**

15. A lift has an upward acceleration of $1.2 m/s^2$. What force will a man weighing 750 N exert on the floor of the lift ? What force would he exert if the lift had an acceleration of $1.2 m/s^2$ downwards ? What upward acceleration would cause his weight to exert a force of 900 N on the floor ?

16.

Fig. 7

In the reciprocating engine mechanism shown in Fig. 7, the crank OA rotates at a uniform speed of 300 rpm. The length of the crank and connecting rod are 12 cm and 50 cm respectively. Find the angular velocity of the connecting rod and velocity of the piston when the crank makes an angle of 30^0 with horizontal.

17. A body moving with SHM, has an amplitude of 1 m and period of oscillation is 2 seconds. Find the velocity and acceleration of the body at t = 0.4 second , when the time is measured from mean position and extreme position ?

C

Reg. No:_____   Name:_____

A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION JULY 2016.
BE 100 - ENGINEERING MECHANICS

Time : 3 Hours   Maximum Marks : 100

Part – A

Answer all the questions. Each question carries 5 Marks (8 X 5 = 40 Marks)

1. Explain the conditions of equilibrium of two force and three force members.
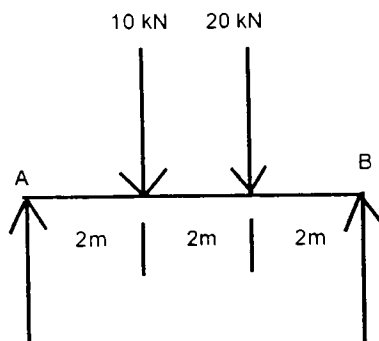2. Calculate the reactions at A and B of the given loaded beam (Fig.1).

Fig.1

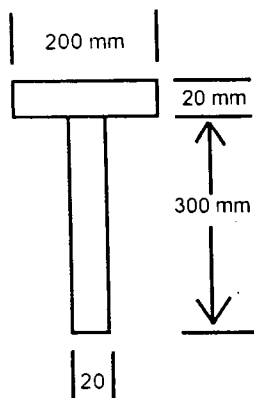3. Locate the centroid of the 'T' section shown in Fig.2

Fig.2

4. Define angle of friction, coefficient of friction and cone of friction.
5. State and explain D'Alembert's principle

1

6. Explain the concepts of instantaneous centre with figure.

7. Explain the following terms with respect to a simple harmonic motion

   (a) amplitude   (b) time period   (c) frequency

8. How can we connect two springs in series? Draw a diagram. Stiffness of two springs are k_1 and k_2. Then what will be the stiffness of the combined system in series? Arrive at the expression.

Part – B
Answer two questions from each SET

SET 1

Each question carries 10 Marks (2 X 10 = 20 Marks)

9. Concurrent forces 1, 3,5,7,9 and 11N are applied at the centre of regular hexagon acting   towards its vertices as shown in Fig. 3. Determine the magnitude and direction of the resultant.
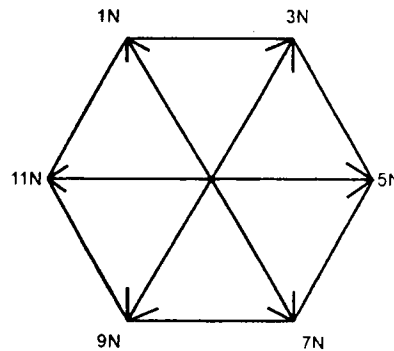

Fig.3

10. A ball of weight 120N rests in a right angled groove, as shown in Fig.4. The sides of the groove are inclined at an angle of 30° and 60° to the horizontal. If all the surfaces are smooth, then determine the reaction R_A and R_C at the points of contact.
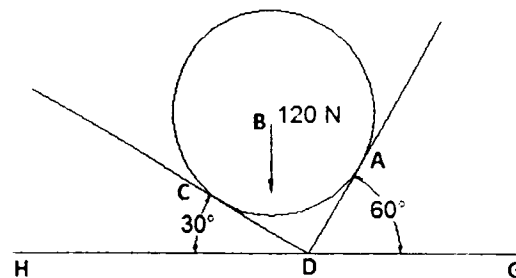

Fig.4

2

C

11. A system of parallel forces is acting on a rigid bar as shown in Fig.5. Reduce this system to a) a single force b) a single force and a couple at A.
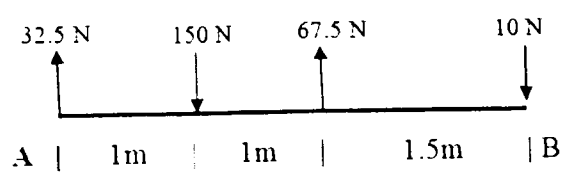


```
      32.5 N        150 N       67.5 N              10 N
        ↑             ↓            ↑                  ↓
        |_____|
      A |    1m    |    1m    |       1.5m       | B
```

Fig.5

SET 2

Answer any 2 questions. Each question carries 10 Marks (2 X 10 = 20 Marks)
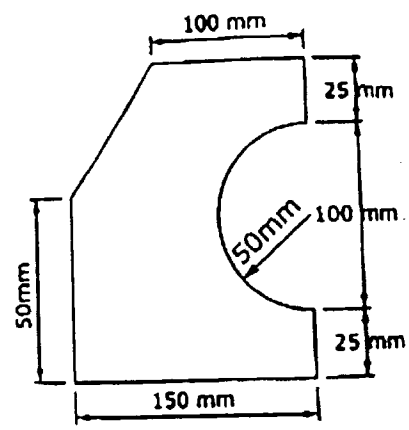
12. Find the centroid of the given Fig.6.

Fig.6

13. A uniform ladder of 4m length rests against a wall which it makes an angle 45^0 as shown in Fig.7. The coefficient of friction between the ladder and the wall is 0.4 and that between the ladder and floor is 0.5. If the man whose weight is on half of that of ladder ascends it, how high will he when the ladder slips?
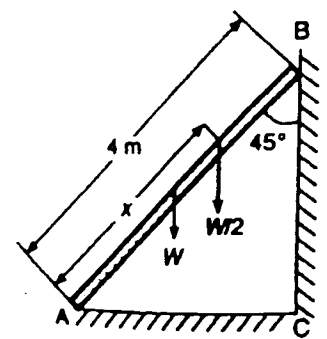

Fig.7

3

C

14. Two blocks A and B of weights 500 N and 1000 N are placed on an inclined plane (Fig.8). The blocks are connected by a string to the parallel plane. The coefficient of friction between the inclined plane and the block A is 0.15 and that for the block B is 0.4. Find the inclination of the plane when the motion is about to take place. Also calculate the tension in the string.
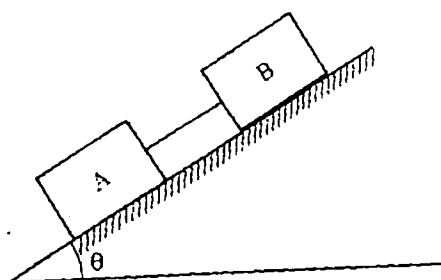

Fig.8

SET 3

Answer any 2 questions. Each question carries 10 Marks (2 X 10 = 20 Marks)

15. An elevator weighing 5000 N is ascending with an acceleration of 3 m/s^2. During this ascent its operator whose weight is 700 N is standing on the scales placed on the floor. What is the scale reading? What will be the total tension in the cables of the elevator during this motion?

16. A weight of 50N suspended from a spring vibrates vertically with amplitude of 8cm and a frequency of 1 oscillation per second. Find (a) the stiffness of the spring. (b) The maximum tension induced in the spring and (c) the maximum velocity of the weight

17. A weight of 100N suspended from a spring vibrates vertically with amplitude of 8cm and a frequency of 1 oscillation per second. Find

(a) The stiffness of the spring

(b) The maximum tension induced in the spring

(c) The maximum velocity of the weight

4

C

10034

Reg.No._____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, AUGUST 2016

BE 100 - ENGINEERING MECHANICS

Time : 3 Hours   Maximum Marks : 100

Part – A

Answer all the questions. Each question carries 5 Marks (8 X 5 = 40 Marks)

1. (a). State the principle of Transmissibility of forces.

    (b). Explain the concept of free body diagrams.

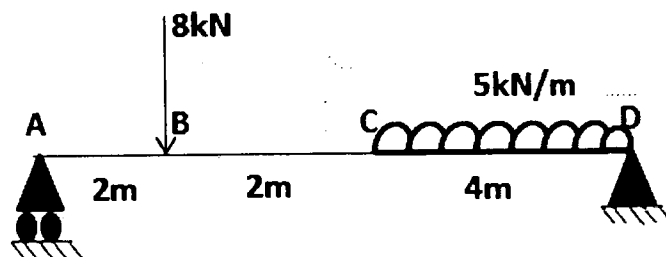2. Find the support reactions in the beam shown in figure 1

Fig.1

3. What is Polar Moment of Inertia? How does it differ from Product of Inertia?

4. Define virtual work and state principle of virtual work.

5. Explain Instantaneous centre of zero velocity. How can you locate it?

6. Calculate the velocity at a point $\frac{2}{3}$ rd radius from the top point of a rail car wheel of radius 250 mm, if the car moves without slipping on straight rails at 15 m/s.

7. Differentiate between free vibration and forced vibration of bodies

8. Explain the concept of single degree of freedom systems.

C

Part – B

Answer two questions from each set

SET 1   Answer any 2 questions. Each question carries 10 Marks (2 X 10 = 20 Marks)

9. Forces of 15N, 20N, 25N, 35N and 45N act at an angular point of a regular hexagon towards the other angular points as shown in figure 2. Calculate the magnitude and direction of the resultant force.
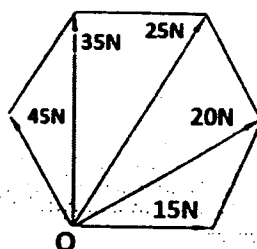

Fig.2

10. A rigid bar AB is acted upon by forces as shown in figure 3. Reduce the force system to (i) a single force (ii) force moment system at A (iii) force moment system at D ......
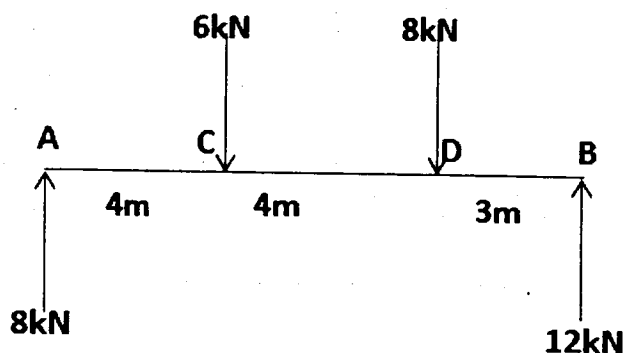

Fig.3

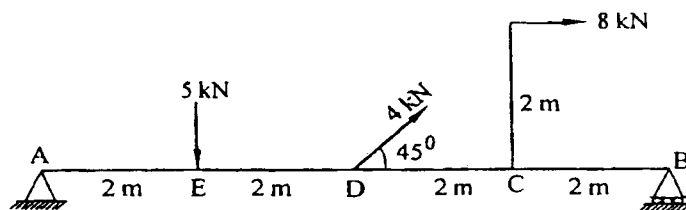11. Determine the reactions at supports A and B of the beam as shown in the figure 4.

Fig.4

C

12. Z - section is shown in the below figure 5. Determine the centroid of the given section after selecting proper references axis.

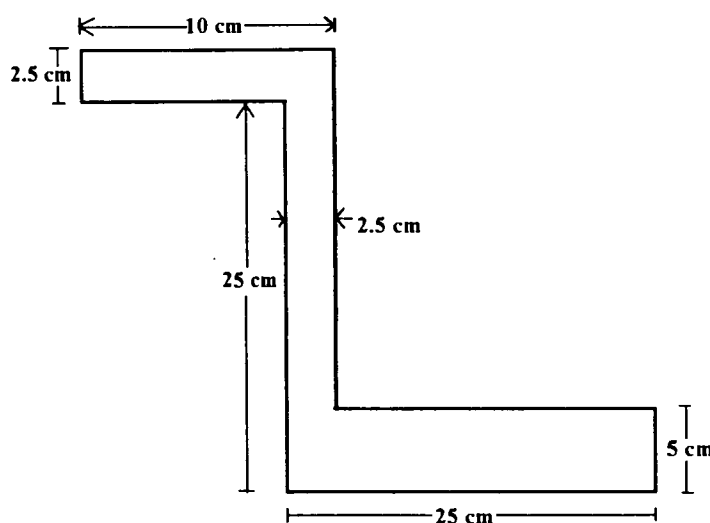   a) X coordinate

    b) Y coordinate

Fig.5

13. A uniform ladder of length 25m and weight W is leaning against a wall. It makes 45^0 with the horizontal. A man whose weight is 0.6 times that of the ladder goes up the ladder. Determine the maximum distance he can climb before the ladder slips. Assume coefficient of friction between the ladder and the wall to be 0.25 and that between the floor and the wall to be 0.3.

14. A simply supported beam of length 4m has a concentrated load of 5kN at 1m from the left support. It also has a uniformly distributed load of 2kN/m over its right half. Find the support reactions using the principle of virtual work.

SET 3 Answer any 2 questions. Each question carries 10 Marks (2 X 10 = 20 Marks)

15. A reciprocating engine mechanism is shown in the figure 6. The crank OA has a constant angular velocity of 300 rpm. The crank OA is of length 12 cm and the connecting rod AB

11004

C

Reg. No.:_____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE110

Course Name: ENGINEERING GRAPHICS

Max. Marks: 50   Duration: 2 Hours

PART A

Answer ANY ONE question.   (1x 11= 11 Marks)

1. The ends of a line AB are 50 mm and 20 mm above HP.The length of its elevation is 70 mm and its VT is 10 mm above HP. The line is inclined at 40° to VP. Find its true length and true inclination with HP. Also locate its traces.

2. The midpoint of a line AB measuring 80 mm is 50 mm above HP and 30 mm in front of VP. The line is inclined at 45° to HP and 30° to VP. Draw the projections and find the length of plan and elevation.

PART B

Answer any 3 Questions (3 x 13 = 39 Marks)

3. A square prism of base side 30 mm and length 50 mm has a base edge on VP, axis inclined at 35° to VP and the resting base edge is inclined at 45° to HP. Draw the projections of the solid.

4. A hemisphere of diameter 80 mm is resting on the ground with its flat surface facing upwards. A square pyramid having side of base 40 mm and axis 60 mm is resting on its base centrally on top of the hemisphere. Draw the isometric projection of the combination of solids.

5. A right circular cone of base diameter 60 mm is cut by a section plane so that the true shape of the section is a parabola of maximum double ordinate 50 mm and vertex of the parabola is 70 mm from this ordinate. Draw the front view, sectional top view and true shape of the section.

6. A cube of 25 mm side is placed vertically with its top face on an auxiliary ground plane, which is at a height of 45 mm above the horizon plane. The nearest vertical edge of the cube touches the picture plane and the adjacent square faces of this edge are equally inclined to the picture plane. Draw the perspective view of the cube, if the station point is 70 mm in front of the picture plane and lies in a central plane which is 30 mm to the right side of the centre of the cube.

11006

Reg. No. : ....   Name : ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016
Course Code : BE110
Course Name : ENGINEERING GRAPHICS

Max. Marks : 50   Duration : 2 Hours

PART – A

Answer **any one** question :   **(1×11=11 Marks)**

1. An 80 mm long line PQ has its end P on the HP and 15 mm in front of the V.P. The line is inclined at 30° to the HP and its top view is inclined at 60° to the reference line. Draw the projections of line PQ and determine true angle of inclination with the VP.

2. Find graphically the length of the largest rod that can be kept inside a hollow cuboid (rectangular prism) of 60 mm x 40 mm x 30 mm.

PART – B

Answer **any three** questions :   **(3×13=39 Marks)**

3. A square pyramid of base side 30 mm and axis length 60 mm is suspended by means of a string from one of its base corners with its axis parallel to VP. Draw its projections.

4. Isometric view of a cylindrical block is shown in Figure 1. Draw the front view, top view and side view from left. Take the arrow direction F as the front side.
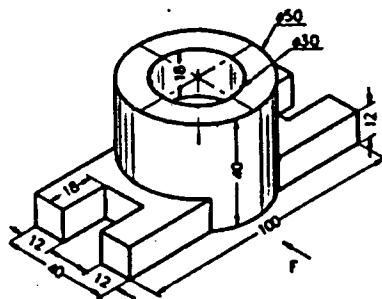

Figure 1

P.T.O.

5. A cylinder of diameter 50 mm and length of the axis 65 mm rests on its base with the axis perpendicular to the HP. It is cut by the cutting plane perpendicular to the VP, inclined at 45° to the HP and passing through a point on axis 25 mm from the top. Draw the front view, the sectional top view and the development of the lateral surface of the cylinder.

6. Draw the perspective projection of a pentagonal prism of side 25 mm and length 50 mm, lying on one of its rectangular faces on the ground plane and one pentagonal face touching the picture plane. The station point is 55 mm in front of the picture plane and lies in the central plane which is 75 mm to the left of the centre of the prism. Station point is 30 mm above the ground plane.

———————

C

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2016

Course Code: BE110
Course Name: ENGINEERING GRAPHICS

Max. Marks: 50   Duration: 2 Hours

PART A

Answer ANY ONE question (1x 11=11 Marks)

1. Three wires AB, CD and EF are tied at points A, C, E on a 14 m long vertical pole at heights 12 m, 10 m and 8 m, respectively, from the ground. The lower ends of the wires are tied to hooks at points B, D and F on the ground level, all of which lie at the corners of an equilateral triangle of 7.5 m side. If the pole is situated at the centre of the triangle, determine the length of each rope and its inclination with the ground.

2. The front and top views of a straight line PQ measures 50 mm and 65 mm, respectively. The point P is on the HP and 20 mm in front of the VP. The front view of the line is inclined at 45° to the reference line. Determine the true length of PQ and its true inclinations with the reference planes. Also, locate the traces.

PART B

Answer ANY THREE Questions (3 x 13 = 39 Marks)

3. A pentagonal prism of 25 mm base side and 50 mm axis length is resting on the H.P. on one of its base corners with its axis inclined at 40^0 to the H.P. and parallel to the V.P. Draw its projection when the base sides containing the resting corner are equally inclined to the H.P.

4. A hexagonal prism having base with a 30mm side and 40mm height is surmounted by a hemisphere such that the hemisphere is touching all the edges of the top face. Draw the isometric view of the arrangement.

5. A cone with a 50 min base diameter and a 70 mm long axis, rests on its base on the H.P. Draw the sectional top view and the development of its lateral surface when it is cut by an inclined plane bisecting the axis and inclined at 45^0 to the H. P.

6. A square prism, having base with a 50mm side, is resting on its base on the H. P. It is completely penetrated by another square prism having base with a 40 mm side, such that the axes of both the prisms intersect each other at right angles and faces of both the prisms are equally inclined to the V.P. Draw the projections of the combination and show the lines of intersection.

11001

Reg. No.: _____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST/SECOND SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPTEMBER 2016

Course Code: BE110
Course Name: ENGINEERING GRAPHICS

Max. Marks: 50   Duration: 2 Hours

PART A

Answer ANY ONE question.   (1 x 11= 11 Marks)

1. The ends of a line AB are 50 mm and 20 mm above HP. The length of its elevation is 70 mm and its VT is 10 mm above HP. The line is inclined at 40° to VP. Find its true length and true inclination with HP. Also locate its traces.

2. The midpoint of a line AB measuring 80 mm is 50 mm above HP and 30 mm in front of VP. The line is inclined at 45° to HP and 30° to VP. Draw the projections and find the length of plan and elevation.

PART B

Answer any 3 Questions (3 x 13 = 39 Marks)

3. A square prism of base side 30 mm and length 50 mm has a base edge on VP, axis inclined at 35° to VP and the resting base edge is inclined at 45° to HP. Draw the projections of the solid.

4. A hemisphere of diameter 80 mm is resting on the ground with its flat surface facing upwards. A square pyramid having side of base 40 mm and axis 60 mm is resting on its base centrally on top of the hemisphere. Draw the isometric projection of the combination of solids.

5. A right circular cone of base diameter 60 mm is cut by a section plane so that the true shape of the section is a parabola of maximum double ordinate 50 mm and vertex of the parabola is 70 mm from this ordinate. Draw the front view, sectional top view and true shape of the section.

6. A cube of 25 mm side is placed vertically with its top face on an auxiliary ground plane, which is at a height of 45 mm above the horizon plane. The nearest vertical edge of the cube touches the picture plane and the adjacent square faces of this edge are equally inclined to the picture plane. Draw the perspective view of the cube, if the station point is 70 mm in front of the picture plane and lies in a central plane which is 30 mm to the right side of the centre of the cube.

C

11008
Reg. No.:...................... Name:...

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST/SECOND SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPT 2016
Course Code: BE110
Course Name: ENGINEERING GRAPHICS

Max. Marks: 50   Duration: 2 Hours

PART A

Answer ANY ONE question (11 Marks)

1. The front and top views of an 80 mm long line PQ measures 70 mm and 60 mm, respectively. The end P is on the HP and the end Q is in the VP. Draw the projections of line PQ and determine its inclinations with the HP and the VP. Also, locate the traces.

2. A room is 4.8 m x 4.2 m x 3.6 m high. Determine graphically, the distance between a top corner and the bottom corner diagonally opposite to it.

PART B

Answer ANY THREE Questions (13 marks each)

3. A square pyramid of base side 30 mm and axis length 60 mm is resting on HP on one of its triangular faces with its axis parallel to VP. Draw its projections.

4. A frustum of a cone of base diameter 50 mm. top diameter 30 mm and height 45 mm is resting upon its base on HP. Draw the isometric projection of the frustum.

5. A pentagonal prism, having a base with a 30 mm side and a 70 mm long axis, is resting on its base on H.P. such that one of the rectangular faces is parallel to the V.P. it is cut by an auxiliary inclined plane making an angle 45^0 with the H.P. and passes through the midpoint of the axis. Draw the sectional top view, true shape of the section and the development of the lateral surface of the truncated prism.

6. A horizontal cylinder of 50 mm diameter and 100mm long penetrates a vertical cylinder of 80mm diameter and 120mm long resting on HP. The axis of the horizontal cylinder is parallel to VP and 60 mm above the HP. Draw the projection showing the curve of the intersection.

10301

Reg. No.:_____

Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE103

Course Name: INTRODUCTION TO SUSTAINABLE ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

*Answer all **a** OR **b** set questions; each question carries 5 marks*

A1. (a)   (2 marks)
(i)   What is sustainable development?   (3 marks)
(ii)   Find the pairs.

Set A: The Vienna Convention, International Union for Conservation of Nature, The Air Act
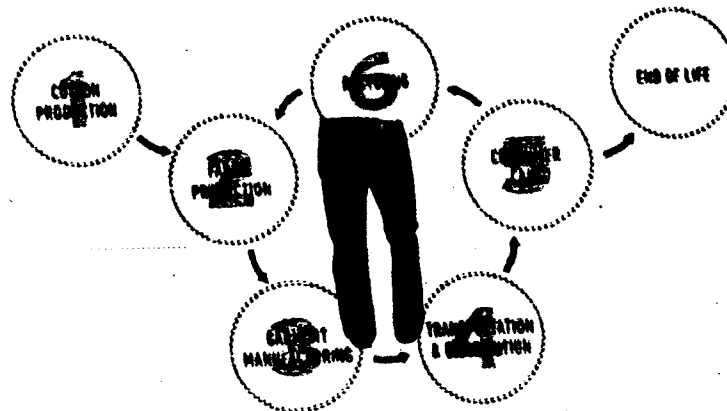
Set B: 1981, 1985, 1948.

OR

A1. (b) Write short note on need of environment sustainability.

A2. (a) Explain Zero Waste Concept.

OR

A2. (b) Explain 3R Concept.

A3. (a) The figure shows cradle to grave journey of a typical Jeans. State atleast one impact in each of the first 5 stage.

OR

A3. (b) A hospital is situated in the middle of a densely populated area. List out any three impacts that can happen to its surroundings and suggest any two methods to reduce it.

A4. (a) Write a short note on sustainable cities.

OR

A4. (b) (i) Give two ways to improve energy efficiency of buildings.   (3 marks)
        (ii) Give a method adopted for maintaining a sustainable transport in our city. (2 marks)

1

A5. (a) There is a remote village on the top of a hill. Explain any two methods that can be adopted there to generate electricity?

OR

A5. (b) Write a short note on fuel cells.

A6. (a) How can energy be derived from oceans?

OR

A6. (b) Cochin International Airport in Kerala, India, is going all in on Solar. 46,150 solar panels are powering the airport. What are the social, economic and environmental advantages of providing power from Solar Energy?

A7. (a) Illustrate industrial symbiosis with a suitable example. What are the major advantages of industrial symbiosis?

OR

A7. (b) Write a short note on Industrial Ecology

A8. (a) What are the main causes of urbanization? List any three urban problems affecting sustainability, faced by the MEDCs (Medium Economically Developed Countries).

OR

A8. (b) Write a short note on Green Engineering.

PART B
(Read the Stories/Cases/Data set as the case may be, and answer ALL questions.
Each FULL question carries 10 Marks)
Module I

In a number of districts of India, Coca Cola and its subsidiaries are accused of creating severe water shortages for the community by extracting large quantities of water for their factories, affecting both the quantity and quality of water. Coca Cola has the largest soft drink bottling facilities in India. Water is the primary component of the products manufactured by the company. There have been numerous public protests of The Coca-Cola Company's operations throughout India, involving thousands of Indian citizens and several non-governmental organizations. Protests against the Coco Cola factories have taken place in a number of districts including: Kala Dera in Rajasthan; Thane in Maharashtra, Sivaganga in Tamil Nadu and Plachimada in Kerala.

B1. (a) Identify how this situation affects sustainability. (3 marks)

(b) If you have been entrusted with taking permanent solution, what all measure will you take? (3 marks)
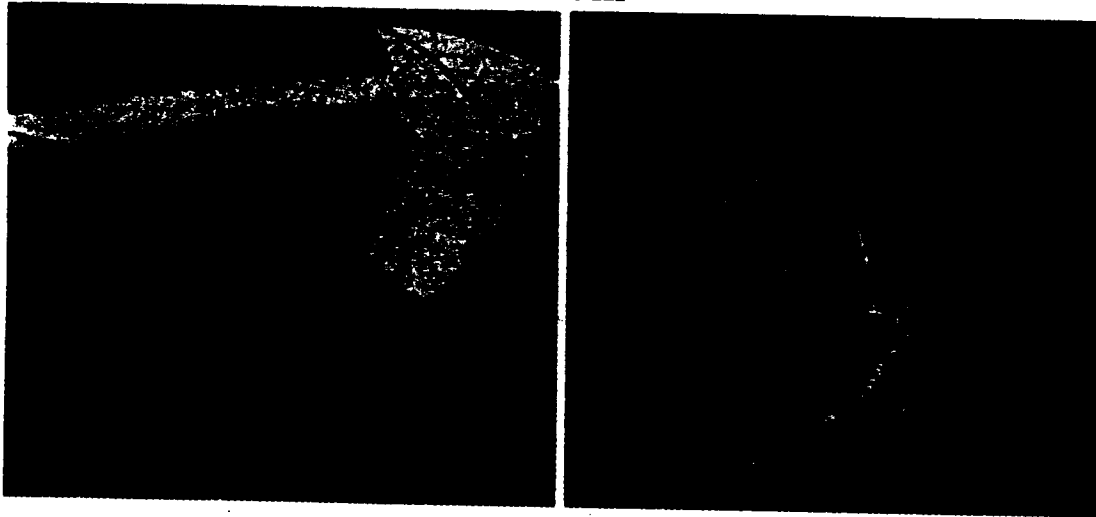(c) Being a protestant bring out sample slogans and key message to address. (4 marks)

Module II

City	Annual Mean Concentration of Particulate matter with diameter of 2.5 microns or less($\mu g/m3$)
Patna	150
Lucknow	115
Gwalior	145
Raipur	130
New Delhi	190
Trivandrum	110
Srinagar	120
Beijing	320
Islamabad	170

B2. (a) Identify the least and most polluted Indian city from the above table. (2 marks)
    (b) Arrange Indian cities in the decreasing order of pollution. (2 marks)
    (c) List out any three effects of air pollution. (3 marks)
    (d) List out any three methods to control air pollution. (3 marks)

Module III

B3. (a) What does the figure represents? (1.5 marks)
    (b) Give a brief explanation. (4 marks)
    (c) Explain any three similar cases. (4.5 marks)

Module IV

Read the conversation and answer the questions of B4.

Rohan was having his breakfast in classroom. Rahul was sitting next to him.

Rahul: *Rohan, Today while I was going through the newspaper I met with a word "Green Building". Does it means a building which is green in colour*
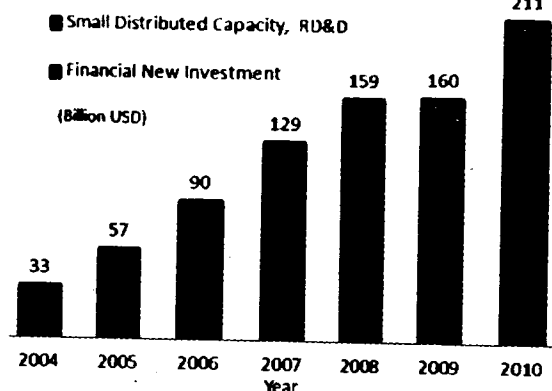
Rohan: *I don't think so. Come let's ask Prof .Thomas.*

B4. (a) Assume that you are Prof. Thomas. What will be your answer to Rahul's question? (3 marks)
    (b) List out any four criteria for selecting a green material. (4 marks)
    (c) Comment on green building certification. (3 marks)
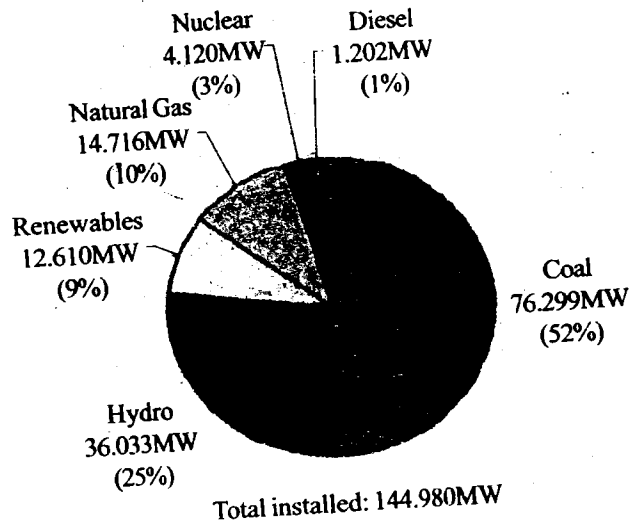
Module V

Global new investment in renewable energy

data source: Bloomberg New Energy Finance, UNEP SEFI, Frankfurt School,
Global Trends in Renewable Energy Investment 2011

■ Small Distributed Capacity, RD&D

■ Financial New Investment

(Billion USD)

Year	2004	2005	2006	2007	2008	2009	2010
	33	57	90	129	159	160	211

B5. (a) Analyse the graph and briefly explain on investment in renewable energy. (4 marks)
   (b) Name any two first and second generation biofuel. (2 marks)
   (c) How can you make use of renewable source of energy at your home? (4 marks)

Module VI

Energy consumption in India per year

Nuclear
4.120MW
(3%)

Diesel
1.202MW
(1%)

Natural Gas
14.716MW
(10%)

Renewables
12.610MW
(9%)

Coal
76.299MW
(52%)

Hydro
36.033MW
(25%)

Total installed: 144.980MW

B6. (a) Analyse the pie chart, prepare a report on energy consumption in India per year. (3 marks)
   (b) The major energy used in India is conventional energy which cause environmental pollution. List out any four methods to prevent pollution. (4 marks)
   (c) List out any three results of pollution prevention. (3 marks)

4

E

10303

Reg. No.:_____ Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE103

Course Name: INTRODUCTION TO SUSTAINABLE ENGINEERING

Max. Marks: 100   Duration: 3 Hours

Part A

(Answer ALL Questions)

A1. (a). (i). Technology may affect sustainability in positive and negative ways. Give one example each for both cases. (2)

(ii). Comment on the challenges for sustainable development in our country and suggest a way to overcome the same. (3)

OR

A1. (b)(i). Under which act did the Centraland State Pollution Control Boards were established in India? List any three of their primary responsibilities. (3)

(ii). Suggest a project under CDM that could be executed in a village in developing nation (2)

A2. (a)(i). Give any 3 examples of air pollutants and their effect on human health. (3)

(ii). Illustrate a typical sustainable waste water treatment system with block diagram. (2)

OR

A2. (b)(i). What is carbon credit? Explain in not more than five sentences. (2)

(ii). Among the major constituents of municipal solid waste, list any three of the most hazardous waste and highlight their impact on the health/human environment. (3)

A3. (a). Suppose you are required to do the Life Cycle Assessment of an Electric Vehicle. In the utilisation stage, the assessment must be made for the energy used to drive the vehicle. List any three possible impacts of the Electric Vehicle during the usage stage?   Suggest a possible way to reduce the impact during utilisation of the vehicle. (3+2=5)

OR

A3. (b). (i). Match the items in the following sets: (2)

Set A: {ISO 14006; ISO 14041; ISO 14048; ISO 14012}

Set B: {LCA Data Documentation Format; Environmental Auditing qualifying criteria; Eco design guidelines; LCA inventory analysis}

(ii). Which steps in Environmental Impact Assessment involve participation from the public? What are the steps involved after the final public consultation? (3)

A4. (a). (i). In order to reduce the energy requirements in Green Buildings, suggest any three design solutions/methods to effect passive cooling during summer months. (3)

(ii). Suggest two water-conserving methods that can be adopted in green buildings (2)

OR

A4. (b). (i).List any three sustainable materials for buildings. (3)

(ii). List any two major characteristics of a sustainable city that address the environmental well-being of the inhabitants. (2)

A5. (a) List five ways in which solar energy could be utilized. (5)

OR

A5 (b). (i).What is biomass energy? How is it extracted? (3)

(ii). Enumerate any two impact of biomass energy on the environment. (2)

A6. (a). Explain a typical wind energy system with a block diagram. (5)

OR

A6. (b). (i).List two methods of extracting energy from the oceans. (2)

(ii). Explain the principle of Geothermal energy generation. (3)

A7. (a).(i). List any three principles of green engineering. (3)

(ii).How can sustainable urbanisation and poverty reduction be related? (2)

OR

A7. (b). What is industrial symbiosis? Give an example. (5)

A8. (a). (i) How does industrial ecology help achieving sustainable development? (3)

(ii). How does material selection influence industrial processes in achieving sustainability? (2)

Part B

(Read the Stories/Cases/Data set as the case may be, and answer ALL questions. Each FULL question carries 10 Marks.)

Case 1

The Nanda Devi Bio sphere Reserve (NDBR) in the western Himalaya has a high level of biological and cultural diversity. The Bhotiya community, whose livelihood is highly dependent on local natural resources, inhabits the buffer zone of NDBR. Bhotiya practice seasonal and altitudinal migration and stay inside the buffer zone of NDBR for only 6 months (May-October). A survey was conducted in 1996 in 5 villages in Pithoragarh District of the buffer zone, where Bhotiya cultivate medicinal plants on their agriculture fields. The aim of the survey was to understand the socioeconomics of medicinal plant cultivation and evaluate the future prospects of this practice in promoting sustainable development among the local community. Of a total of 71 families, 90% cultivated medicinal plants on 78% of the total reported cultivated area (15.29 ha). At the time of the survey, a total of 12 species of medicinal plants were under cultivation, of which 6 were being marketed while the remaining 6 were still under nursery plantation for future propagation. Based on the average productivity, it was estimated that an average family could earn between Rs.4362 and Rs.86, 500 from the sale of medicinal herbs. Encouragement of medicinal plant cultivation at high altitudes in the Himalayas would help to generate better monetary returns as well as conserve these herbs in the wild and preserve traditional ethno medicinal knowledge among local people.

Module 1

QB1.

a) Illustrate how the above story can be related to attaining social, economic and environmental sustainabilities. (1+1+1)
b) Imagine that a campaign on medicinal plant cultivation is to be initiated. Frame a slogan and a key message that need to be addressed. (1+1.5)
c) Enumerate 3 ways to inspire the youth of the Bhotiya community to take up medicinal plant cultivation as their career option. (0.5+0.5+0.5)
d) Identify any two major areas of challenges for the sustainable development in the NDBR. Suggest a way to overcome the same. (2+1)
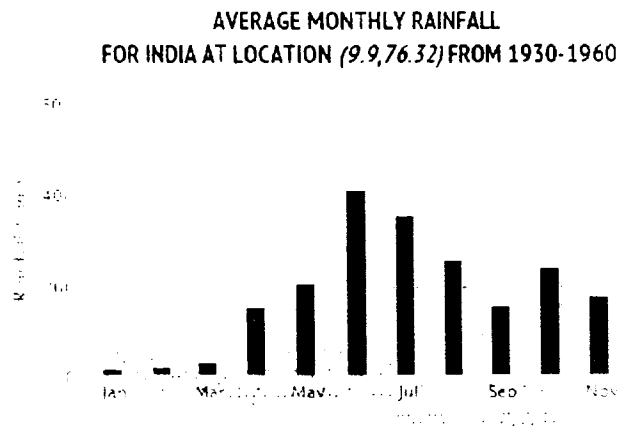
Sample Case/Data 2

AVERAGE MONTHLY RAINFALL
FOR INDIA AT LOCATION *(9.9,76.32)* FROM 1930-1960

Figure 1: Average monthly rainfall at Kochi for the period 1930-1960

AVERAGE MONTHLY RAINFALL
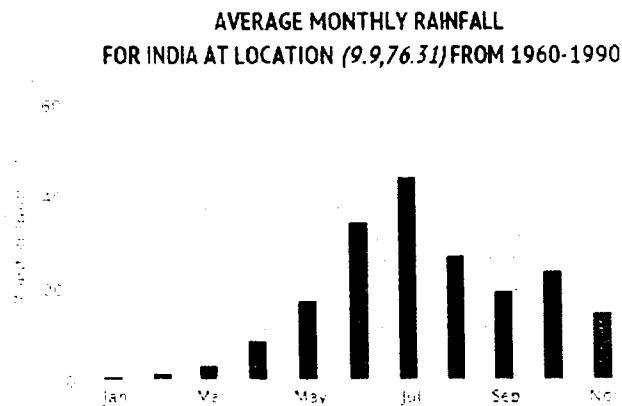### FOR INDIA AT LOCATION *(9.9,76.31)* FROM 1960-1990

Figure 2: Average monthly rainfall at Kochi for the period 1960-1990

Module 2

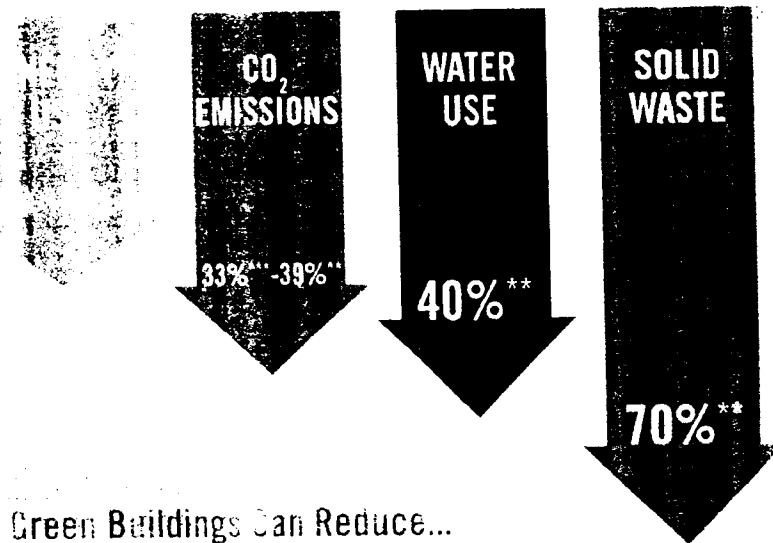QB2. Referring to Figures 1 and Figure 2, answer the following questions.

a) Compare and contrast the average monthly rainfall at Kochi in the month of July as a pie chart showing as a percentage of total rainfall. (4)
b) Identify the period of North West Monsoon from the figures. (2)
c) Point out any two major reasons for the change of rainfall pattern at Kochi. (2+2=4)

Module 3

QB3. Discuss the LCA analysis of polythene carry bags. (2.5+2.5+2.5+2.5=10)

Sample Case/Data 3

CO$_2$ EMISSIONS WATER USE SOLID WASTE

33%***-39%** 40%** 70%**

Green Buildings Can Reduce...

Module 4

QB4.

a) Illustrate how green buildings can reduce energy use and solid waste. (3+3=6 marks)
b) How can rain water harvesting be incorporated in the existing design of buildings? How does it lead to the reduction of water use? (2+2 marks).

Sample Case/Data 4

The Gujarat government is all set to develop India's first tidal energy plant. The state government has approved Rs 25 crore for setting up the 50 MW plant at the Gulf of Kutch. It will produce energy from the ocean tides. According to the officials, if this 50 MW plant is successfully commissioned, its capacity will be increased to 200 MW. As per a study conducted by Atlantis Resource Corporation and the state government two years ago, the Gulf of Kutch has a total potential of 300 MW. But despite the huge potential, India has no policy on tidal energy. A clear policy is very important for developers to have clarity on tariff and commercial development of tidal energy in the country. The Gujarat government last year approved a 10 MW tidal energy plant proposed by Urja Global Limited in association with a US-based company Ocean Energy Industries. But no date has been given for starting the project yet.

SREE BUDDHA COLLEGE OF ENGINEERING

Module 5

QB5.

a) Suggest two ways to improve the commercial development of tidal energy in India (6)
b) Enumerate two ways to create awareness about Tidal power projects to fishermen. (2)
c) Enumerate a few challenges as to why the proposed Vizhinjam Tidal power project in Trivandrum is not yet implemented. (2)

Sample Case/Data 5

Rapid urbanisation is arguably the most complex and important socio-economic phenomenon of the 20th and 21st centuries. Generally understood as a shift from a predominantly rural to a predominantly urban society, it also represents major and irreversible changes in production and consumption and the way people interact with nature. It is therefore somehow surprising that, within the international debate, it is only recently that cities and the urbanisation process started to be looked at through a 'sustainability' lens.

Module 6

QB6.

a) How can urbanisation and sustainability be combined? Illustrate your answer with two real world examples. (2+3= 5)

b) Relate unsustainable urbanisation to the growing water scarcity in our country and suggest a way to overcome the same. (3+2 = 5)

D

Reg. No. : ....   Name : ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016
BE 102 : DESIGN AND ENGINEERING

Max. Marks : 50   Duration : 2 Hours

Instructions : *Answer all questions; this is an open book examination and the students are **permitted** to use text books, class notes, own notes, earlier assignments; but access to mobile phone and internet is **not allowed**.*

PART – A

Each question in Part **A** carries **5** marks.

1. In an ordinary bicycle, name at least 6 parts that are not made of metal. Sketch any one of these parts.

2. How modular design is realized in i) Umbrella and ii) Ink Pen ? Draw the different modules involved in each of these products.

3. Design of a chair with steel tube is shown in Figure. The seat and the back rest are made of wood and are screwed on to the steel frame. Identify the interesting aspect of this design and list the number of different parts used for the chair.
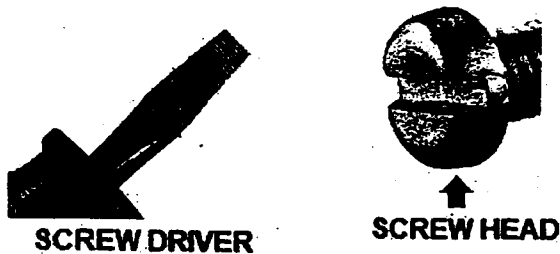

4. Devolve a questionnaire for user centered design for an automobile.

5. Considering the principle of value engineering, design a suitable product for easy cleaning of dust from windows, fans and lamp shades.

P.T.O.

6. Sketches of a screw driver and a normal screw head are given below :

SCREW DRIVER   **SCREW HEAD**

This screw could be tightened or loosened using the screw driver. Now design the head of such a screw that could only be tightened but not loosened by this screw driver.

PART – B

Each question in Part **B** carries **10** marks.

7. Without using an air-conditioner, blower or exhaust fan, design a natural system of heat removal from the rooms of a building and simultaneous inflow of fresh air from outside into the room. Prepare the necessary sketches and justify your answer.

8. Develop and sketch anyone design concept of a mechanical system to drive a generator for energy harvesting by exploiting heavy traffic.

D

Reg. No:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SECOND SEMESTER B. TECH. DEGREE EXAMINATION, JULY 2016
BE 102: Design and Engineering

Duration: **Two hours**   Maximum mark: **50**

(*Instructions*: *Answer all questions; this is an open book examination and the students are permitted to use text books, class notes, own notes, earlier assignments; but access to mobile phone and internet is not allowed)*

Part A
(*Each question in part A carries 5 marks*)

1. Four different design of drinking water glasses (i.e., Glass A, B, C, and D) are shown below. Discuss the merits and demerits of each of these four designs.
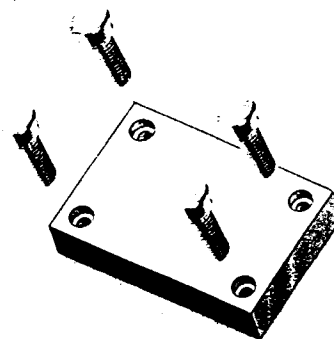

   a. Glass A   **b. Glass B**   **c. Glass C**   **d. Glass D**

2. Figure given below shows a screw with a cylindrical head. Modify the design of the screw head so that the screw could be tightened even when it is sunk in the hole as shown.
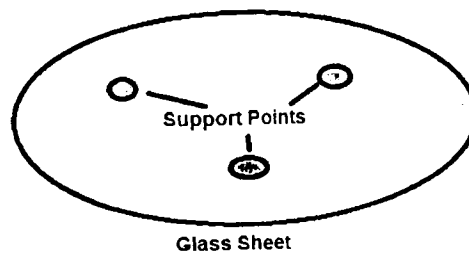
3. Discuss briefly any five" X" to be considered in the design for "X" of a bag to make it competitive in the market.

4. Identify all the possible customers of a washing machine and prepare questionnaires for each group in order to collect customer requirements.

5. Develop and sketch a new design for a hand held remote control for household equipments which is ergonomically and aesthetically better than conventional one.

6. Design a quick removable handle for the mug shown.

Part B

(Each question in Part B carries 10 marks)

7. A round glass of 600 mm diameter and 6 mm thick is available. This is to be designed as a table supported at three points by a steel tube bent in any convenient way. The height of the table is to be 300 mm and the total length of the tube used should not exceed 1.8 m. The tube should not be cut or joined. Design the bent tube for supporting the table.

Glass Sheet

8. Public taps are now fitted with electronic sensors for hands free operation. Sketch the Design concepts of an automatic hands free flushing system for use in toilets. The system should be purely mechanical without any electronic circuits.

F

10012

Reg. No.: _____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: CE100

Course Name: BASICS OF CIVIL ENGINEERING

Max. Marks: 100   Duration: 3 Hours

Part A

Answer ALL questions. Each question carries 3 marks

1.   Explain relevance of Civil engineering in the overall infrastructural development of the country.
2.   Discuss the difference between plinth area and carpet area.
3.   Enumerate the principles considered for the survey of a land.
4.   Explain different types of steel with their properties.
5.   Define bearing capacity of soil.
6.   What are the various roofing materials available?
7.   List the different types of flooring materials.
8.   What are the purposes of air conditioning a building?
9.   Write short note on towers.
10. Difference between elevators and escalators.

Part B

Answer any 8 questions (6 x 8 = 48 Marks)

11. List out the types of building as per occupancy. Explain any two, each in about five sentences.
12. Discuss the components of a building with a neat figure.
13. List the steps in the setting out of foundation in centre line method
14. What are the open space requirements you should provide in constructing a building?
15. What are the points to be considered while selecting the position of doors and windows inside a building?
16. Write short notes on Total Station.
17. The following staff readings were observed successively with a level, instrument having been moved after third, sixth and eighth readings: 2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684, meters. Enter the above readings in a page of a level book and calculate R.L. of points if the first reading was taken with a staff held on a bench mark of 432.384 m.

18. What are the constituents of cement and explain the function of each?

19. Write short notes on electronic distance meter and digital level.

20. What are the different kinds of cement available and what is their use?

Part C

Answer any 2 full questions

21. A) Draw neat sketch of the following foundations. (6)

   (i) Isolated stepped footing (ii) Cantilever footing (iii) Continuous footing.

   B) Draw the elevation and plan of one brick thick wall with English bond (5)

22. A) Explain step by step procedure for finishing of a wall using plastering (5)

   B) What is meant by intelligent building? What are the various conditions to be satisfied by intelligent buildings? (6)

23. A) Explain different types of air conditioning systems. (5)

   B) What are the major sound proofing materials? Explain briefly. (6)

F

PART – A

Answer all questions. **Each** question carries **3** marks.   **(10×3=30 Marks)**

1. Explain very briefly about the classification of buildings based on occupancy.

2. 'Orientation is an essential step while planning a building'. Comment.

3. What are the principles of surveying ?

4. List out the commercial forms of steel available.

5. What do you mean by bearing capacity of soil ?

6. Explain the following terms related to brick masonry: Course, Queen closer & Perpends.

7. Explain how to prepare a wall surface for painting.

8. Differentiate between elevators and escalators.

9. What are the purposes of air conditioning of a building ?

10. What are the precautions taken to achieve imperviousness of water tanks ?

PART – B

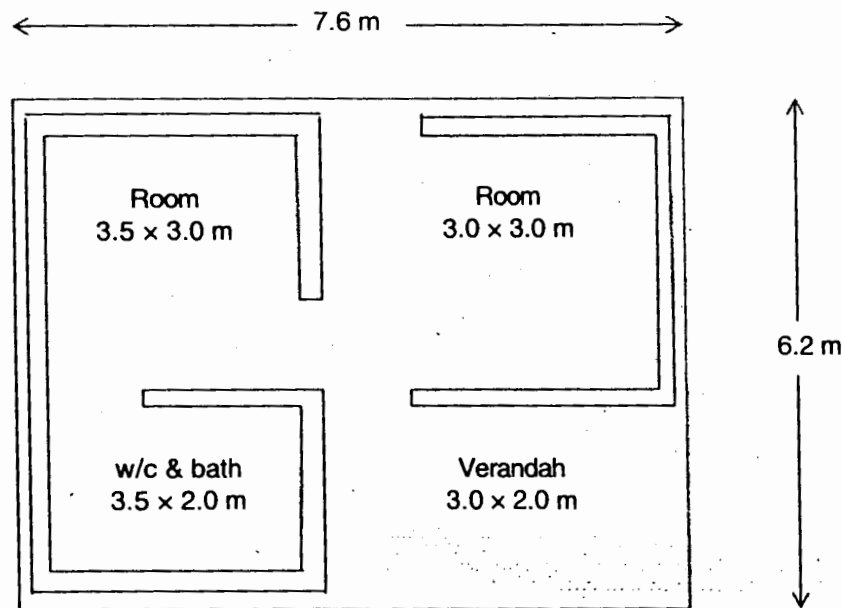Answer **any 8** questions.   **(6×8=48 Marks)**

11. Write a short note on various components of a residential building and their functions.

12. Write a note on the importance of civil engineering on infrastructural development of India.

P.T.O.

13. Calculate plinth area, floor area and carpet area for the plan of a building given below: Wall thickness is 30 cm.

14. Explain the need and types of open space requirement for a building.

15. Explain the centre line method adopted for setting out of a building.

16. What is direct ranging and what are the instruments used for ranging ?

17. The following consecutive readings were taken with a dumpy level and a 4 m levelling staff on a continuously slopping ground at a common interval of 30 m:

0.585 on A, 0.930, 1.955, 2.840, 3.645, 0.960, 1.035, 1.680, 2.535, 3.845, 0.950, 1.575, 3.015 on B. The elevation of A was 520.150. The instrument was shifted at 6th and 11th readings.

A) Rule out a page of level book and enter the above readings.

B) Find R.L of B.

C) Determine the gradient of line AB.

18. What is the composition of ordinary cement ? Briefly explain grades of cement.

19. Explain the preparation of concrete.

20. What are the characteristics of a good brick ?

PART – C

Answer **any 2** full questions.

21. A) Define :
    i) Span
    ii) Ridge
    iii) Eaves
    iv) Batten
    v) Cleats. **(1×5=5 Marks)**

    B) Describe the functions and various types of foundations. **(6 Marks)**

22. A) Explain the method of applying plaster on a wall surface. **(5 Marks)**

    B) Explain the concept of intelligent building. **(6 Marks)**

23. A) How is sound proofing done in a building ? **(5 Marks)**

    B) List out the specification of the following : **(6 Marks)**
    i) Towers
    ii) Chimneys
    iii) Water tanks.

———————

10013

PART A

Answer ALL questions. Each question carries 3 marks

1. List out any six disciplines of civil engineering.

2. What are the factors affecting site selection of a building?

3. What is direct ranging?

4. Illustrate any 6 properties of good bricks.

5. What do you mean by bearing capacity of soil?

6. What are the various flooring materials available?

7. Differentiate between header bond and stretcher bond.

8. Discuss the principles of comfort air conditioning

9. Explain about towers and its uses?

10. What do you mean by intelligent building?

PART B

Answer any 8 questions (6 x 8 = 48 Marks)

11. Describe with sketches the components of a residential building.

12. How can you classify the buildings based on occupancy according to National Building Code? Explain briefly.

13. Describe about the site plan of buildings.

14. Explain setting out of a building.

15. What are the factors affecting orientation of a building?

16. What are the main principles of surveying?

17. The following consecutive readings were taken with a dumpy level: 0.555, 0.725, 1.235, 0.73, 0.825, 1.560, 0.285, 0.945, 0.785, 2.465. The instrument was shifted after the third and seventh reading. The first reading was taken on a benchmark whose R.L. is 100.00 metres. Rule out the

page of a level field book and enter the above readings. Calculate the reduced levels of stations and apply arithmetic check.

18. What are the constituents of good brick earth?

19. Explain types of cements and its uses.

20. Mention the physical and chemical properties of OPC.

PART C

Answer any 2 full questions

21. a) Write short note on emulsion and distempering (5)

    b) Describe the functions of various types of foundations (6)

22. a) Explain the method of applying plaster on a wall surface. (5)

    b) Explain the civil engineering aspects of escalators and elevators in detail? (6)

23. a) What are the practical measures to provide sound insulation in a building? (5)

    b) What are the limitations of intelligent buildings over ordinary buildings? (6)

10015

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPTEMBER 2016

Course Code: CE100

Course Name: BASICS OF CIVIL ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. Explain the role of civil engineers to the society in various fields.
2. Write down the various details to be included in the site plan.
3. Explain the terms: (i) Benchmark (ii) Datum.
4. Illustrate any 6 properties of good bricks
5. Differentiate between header and stretcher bonds in brick masonry.
6. Explain the different types of roofing materials.
7. Explain the procedure for preparing the surface for painting.
8. What are the purposes of air conditioning a building?
9. List various materials used for sound proofing.
10. List out the limitations of intelligent building.

PART B

Answer any 8 questions (6 x 8 = 48 Marks)

11. What will be the conditions for the selection of site to buy a plot for constructing a residential building?
12. Illustrate the components of residential building and their function with neat sketch.
13. Explain the orientation of a building in tropical climate.
14. Explain the procedure for setting out of building by centre line method.
15. "Doors should be provided in such a way that there is maximum work space in front of the door and wastage of space is to be reduced." Justify the statement with neat figures.
16. Write short notes on : i) Total station   (ii) EDM   (iii) GPS
17. The following consecutive readings are taken on a level with station A as Bench Mark with RL 200.000m. They are 2.190, 3.150, 1.060, 0.230, 3.430, 3.170, 3.420, 3.720 and 2.390. The instrument is shifted after the reading 3.430. Enter these readings in a level field book and calculate the reduced levels of all points by Height of Instrument method.

18. List out the properties of mild steel and HYSD steel.

19. Explain plinth area, floor area, carpet area, plot area, coverage, and floor area ratio.

20. What are the constituents of RCC? List out the grades of concrete with their uses.

PART C

Answer any 2 full questions

21. A) Differentiate between shallow and deep foundations (5)

    B) Draw the plan and elevation of one brick thick wall in English bond. (6)

22. A) Explain any five types of paints with their functions. (5)

    B) Differentiate between Elevators and Escalators. (6)

23. A) Explain the different types of towers in detail. (5)

    B) What are the main features of an intelligent building? (6)

F

Reg. No.:_____ Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: ME100

Course Name: BASICS OF MECHANICAL ENGINEERING ·

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each question carries 3 marks

1. "No engine can be made to work on Carnot cycle" Justify the statement.

2. What will happen, when diesel fuel is accidentally filled to a petrol car?

3. You are appointed as an engineer in a refrigerator manufacturing company and are assigned by a task of selecting the refrigerant. While selecting the refrigerant point out the desirable properties you consider?

4. Carburetor engines are now being replaced by MPFI engines. Comment.

5. List out the different processes involved in powder metallurgy in the correct order.

6. List out any six important properties of moulding sand.

7. Identify the main operations which can be performed by a Lathe.

8. What is the principle of operation of a planer?

(8 x 3 = 24 Marks)

PART B

Answer any 2 complete questions each having 6 marks

9. Draw the P-V and T-S diagram of a Carnot cycle and explain the processes.

10. In a constant volume 'Otto cycle', the pressure at the end of compression is 15 times that at the start, the temperature of air at the beginning of compression is 38 ^{o}C and maximum temperature attained in the cycle is 1950 ^{o}C. Determine (i) Compression ratio (ii) Thermal efficiency of cycle (iii)Work done per kg of air. Take γ for air =1.4

11. Explain the principle of increase of entropy.

Answer any 2 complete questions each having 6 marks

12. With the help of a neat sketch explain the working of a reciprocating compressor.

13. Compare the working of two stroke and four stroke internal combustion engines.

14. How is steam produced in a fire tube boiler? Explain with a neat figure.

15. Write a short note on impact of refrigerants on environment.

16. Demonstrate the working of a vapour compression refrigeration system with the help of a neat sketch.

17. Distinguish between window air conditioner and split air conditioner.

18. Explain the working of a cone clutch in an automobile.

19. Sketch different types of gear trains and explain.

20. Explain the different types of brakes.

PART C

21. Discuss the various properties of engineering materials.

22. In a certain fabrication industry, they want to join two dissimilar metal pipes, which method should they follow? Justify.

23. Differentiate between welding, brazing and soldering.

24. Draw the neat sketch of a lathe and explain its principle parts.

25. Explain the working principle of a shaping machine.

26. With a neat sketch, explain a drilling machine.

Reg. No. : ....   Name : ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016
ME100 : BASICS OF MECHANICAL ENGINEERING

Max. Marks : 100   Duration : 3 Hours

PART – A

Each question carries **3** marks :

1. Discuss the first law of thermodynamics applied for a process.

2. Why compression ratio of petrol engine is low compared to diesel engines ?

3. Differentiate between DBT and WBT.

4. What are the desirable characteristics of a good fuel ?

5. Why alloys are preferred over pure metallic materials in engineering applications ?

6. Discuss how thin sheets are manufactured ?

7. Mention the importance of forging.

8. List and explain any three operations performed on drilling machine.

PART – B

Answer **any two** questions from **each** Module.
Each question carries **6** marks.

Module – I

9. State and explain second law of thermodynamics. Give its application.

10. An engine operation on an air standard Otto cycle has a compression ratio equal to 7. The conditions at the start of compression are 0.1 MPa and 300 K. The pressure at the end of heat addition is 4 MPa. Determine :
    i) thermal efficiency
    ii) net work done where $C_v = 0.718$ kJ/kg, $\gamma_{air} = 1.4$.

11. Sketch and explain the ideal cycle for petrol engines.

P.T.O.

Module – II

12. Explain with neat sketch the working of a petrol engine that produces power in a single revolution.

13. With neat sketch explain the working of centrifugal air compressor.

14. Differentiate between air motors, blowers and compressors.

Module – III

15. What are the two types of refrigeration systems ? How they differ between each other in terms of the working principle ?

16. Differentiate between summer and winter air conditioning.

17. Sketch the different processes in a psychometric chart and discuss.

Module – IV

18. Discuss the classification of IC Engines.

19. Explain about MPFI, CRDI and Hybrid engines.

20. What are the different types of drives used for power transmission in an IC engine and compare between them ?

PART – C

Answer **any 2** questions from **each** Module.

Each question carries **7** marks.

Module – V

21. Write down the procedure for developing a mould for a component.

22. Discuss any two metal joining process.

23. Name five alloys and their applications.

Module – VI

24. Differentiate between NC and CNC machines.

25. Identify the parts of lathe shown in Figure 1 and explain the various operations that can be performed on the lathe.
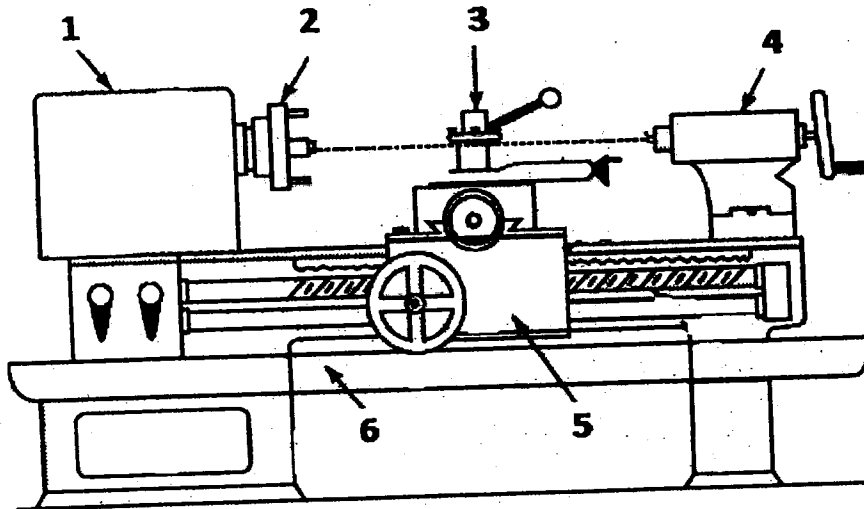

Figure 1

26. Discuss the operations which can be performed on a drilling machine.

F

10018

Reg. No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2016

ME100 BASICS OF MECHANICAL ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. "Entropy of the universe is increasing". Comment.
2. Write any three differences between fire tube and water tube boilers?
3. Differentiate between comfort and industrial air conditioning.
4. Bring out the concept of hybrid vehicles.
5. Give examples of three alloys and state their applications.
6. Differentiate between soldering and brazing.
7. List the applications of milling machine.
8. List any six machining operations that are performed on a lathe.

PART B

Answer any 8 Questions (2 QUESTIONS FROM EACH MODULE)
Each question carries 6 marks

MODULE I

9. State the first law of thermodynamics for a process and cycle. Bring out the limitations

10. Sketch a Brayton cycle and explain.

11. A Carnot cycle works with adiabatic compression ratio of 5 and isothermal expansion ratio 2. The volume of air at the beginning of isothermal expansion is 0.3 m3. If the maximum temperature and pressure is limited to 550 K and 21 bar, determine (a) minimum temperature in the cycle, (b) thermal efficiency of the cycle, (c) pressure at all salient points. Take $\gamma = 1.4$.

MODULE II

12. Differentiate between fan, blowers and compressors.

13. Discuss the working of a four stroke SI engine.

14. With a neat sketch explain the working of centrifugal pump.

MODULE III

15. Explain the working of vapour compression refrigeration system.

1

16. Explain about the different refrigerants used and their impacts on the environment
17. With the help of psychrometric chart explain various psychrometric processes.

MODULE IV

18. Discuss on CRDI and MPFI technology.
19. How can you arrange gears for transmitting power from one shaft to another?
20. Illustrate the working single plate clutch.

PART C

Answer any 4 questions (ANY 2 QUESTIONS FROM EACH MODULE)
Each question carries 7 marks

MODULE V

21. Write short notes on (i) Forging (ii) Rolling
22. Which manufacturing process uses mould to produce desired parts? And list out all possible defects during this process.
23. What is powder metallurgy? What are the basic steps of powder metallurgy?

MODULE VI

24. Describe a milling machine.
25. Explain the merits of CNC machine over conventional machine.
26. Shaper is used to produce flat surfaces. explain the principal parts assist to produce flat surfaces?

F

10022

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

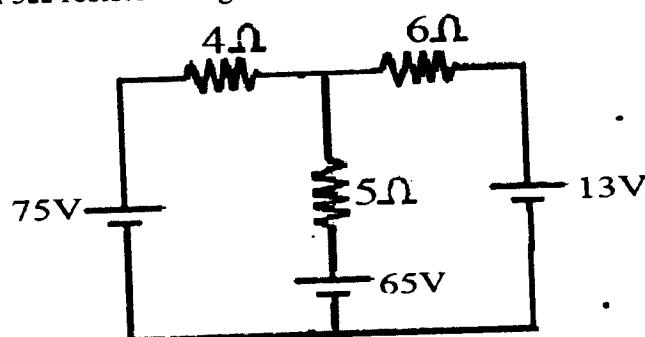## Course Code: EE100

Course Name: BASICS OF ELECTRICAL ENGINEERING

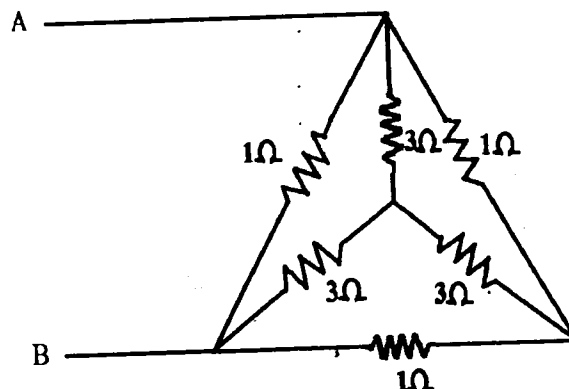Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks

1. Find the current through 5Ω resistor using Nodal analysis

2. Determine the equivalent resistance RAB using Star-Delta Transformation.

3. Differentiate between statically and dynamically induced emf.

4. Prove that the average power for a purely capacitive circuit is zero.

5. What are the advantages of three phase system over single phase system?

6. Give the reason for using high voltage in power transmission system.

7. What are the different types of losses in a transformer?

8. Single phase induction motor is not self-starting. Comment.

9. Draw the schematic layout of LT switch board.

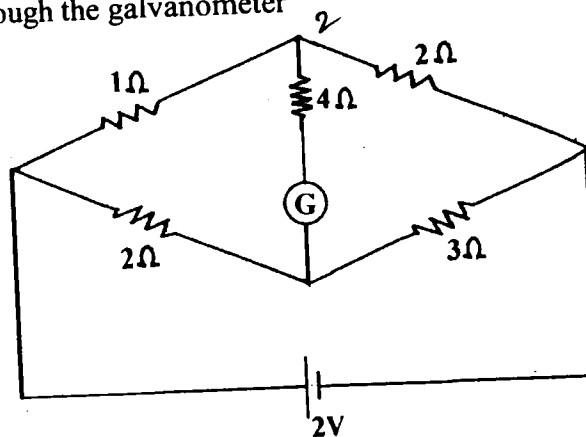10. 'Earthing is necessary'. Comment on the statement.

<div align="right">(10 x 4 = 40 Marks)</div>

PART B

Answer any 4 FULL questions each having 10 marks

<div align="right">(10)</div>
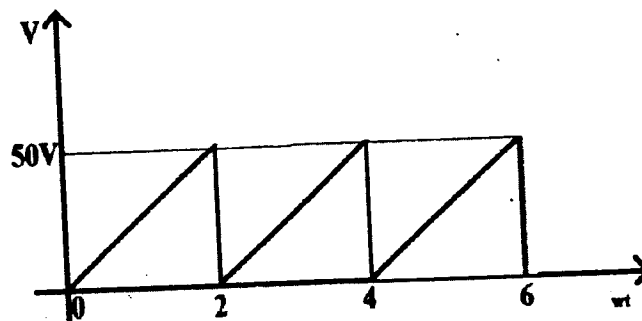
11. Calculate the current through the galvanometer

12. A steel ring of 25cm diameter and of circular cross section 3cm in diameter has an air gap of 1.5mm length. It is wound uniformly with 750 turns of wire carrying a current of 2.1 A. Calculate (i) m.m.f (ii) flux density in air gap (iii) magnetic flux (iv) relative permeability of steel ring. Assume that iron path takes about 35% of total magnetomotive force.   (10)

<div align="right">(10)</div>

13. Determine the form factor of the saw tooth wave shown:

14. Explain how power is measured in a three phase system using two wattmeters.   (10)

15. With a neat schematic diagram, explain a hydroelectric power generation plant.   (10)

16. With a neat diagram, explain a typical power transmission scheme.   (10)

<div align="right">(4x10=40 Marks)</div>

2

17. With neat sketch give the construction details of a DC machine? (10)

OR

18. a) A single phase transformer has a core whose cross-sectional area is 150 cm^2, operates at a maximum flux density of 1.1Wb/m^2 from a 50Hz supply. If the secondary winding has 66 turns, determine the output KVA when connected to a load of 4Ω impedance. Neglect any voltage drop in transformer. (5)

b) The power input to a 230V dc shunt motor is 8.477kW. The field resistance is 230Ω and armature resistance is 0.28Ω. Find input current, armature current and back emf. (5)

Answer any one FULL question having 10 marks

19. a) Discuss the different tariff scheme employed for LT and HT consumers. (5)

b) With neat diagram, explain pipe earthing in electrical installation. (5)

OR

20. Discuss the difference between ELCB and MCB with neat diagram. (10)

F

Reg. No. : ....   Name : ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016
EE100 BASICS OF ELECTRICAL ENGINEERING

Max. Marks : 100   Duration : 3 Hours

PART – A

Answer **all** questions, **each** question carries **4** marks :

1. State and explain Kirchhoff's laws.

2. What are constant voltage and constant current sources ? Voltage and current sources are mutually transferable. Explain. Derive the relationship between line and phase voltage in a star connected system.

3. Prove that in a purely inductive circuit the current lags behind the applied voltage by 90 degree and the power consumed is zero.

4. In the two wattmeter method of power measurement in a three phase circuit, the readings of the wattmeters are 4800W and – 400W. Find the total power and power factor of the load.

5. Draw and explain the typical electrical power transmission scheme.

6. Derive the e.m.f equation of a single phase transformer.

7. Explain the necessity of starter in a DC motor.

8. Compare the performance of incandescent, fluorescent, mercury vapour and metal halide lamps in terms of efficacy, colour rendering index and life.

9. Compare uniform tariff and differential tariff.

10. What are the different types of lamps available in the market ? Give the specifications of a typical lamp. What are the advantages of LED lamps ?
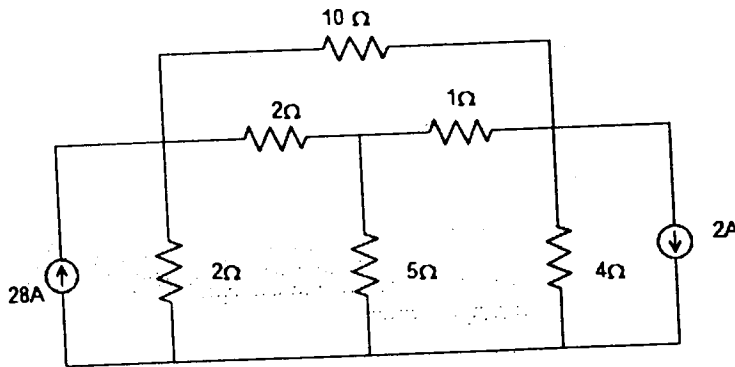
(10x4=40 Marks)

P.T.O.

PART – B

MODULE (1 – 4)

Answer **any four** questions, **each** question carries **10** marks :

11. Use nodal analysis to form network equations and solve the nodal voltages using matrix method. Also calculate the current in different branches. **(10)**

12. A steel ring of circular cross section of 1 cm in radius and having a mean circumference of 94.3 cm has an air gap of 1 mm long. It is uniformly wound with an exciting coil consisting of 600 turns and excited with a current of 2.5 A. Neglecting magnetic leakage
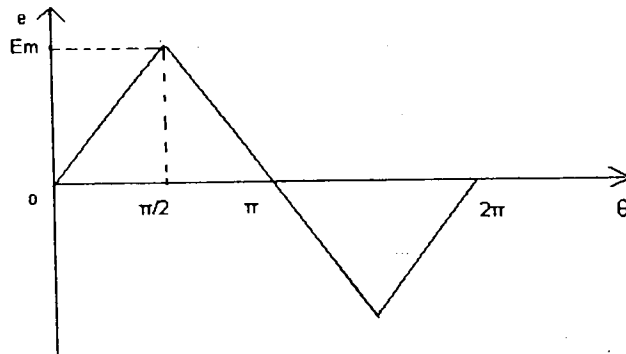
Calculate :

   i) m.m.f

   ii) Magnetic flux

   iii) Reluctance

   iv) Flux density

   v) Relative permeability of steel.

Assume that steel part takes about 40% of total ATs. **(10)**

13. a) Define the rms value and average value of an alternating quantity. **(4)**

b) Find the rms value and average value of the given waveform. **(6)**

14. A Series R-C circuit takes a power of 7000W when connected to 200V, 50Hz supply. The voltage across the resistor is 130 V.

Calculate :

   i) Resistance

   ii) Current

   iii) Power factor

   iv) Capacitance

   v) Impedance

   vi) Equations for instantaneous values of voltage and current. **(10)**

15. Explain the measurement of power in a three phase system by using two wattmeter with relevant phasor diagrams. **(10)**

16. With the help of block diagram explain the working of a Thermal power plant. **(10)**

(4×10=40 Marks)

MODULE – 5

Answer **any one full** question :

17. a) What are the losses of single phase transformer ? **(4)**

   b) A single phase transformer has 400 and 1000 primary and secondary turns respectively. The net cross sectional area of the core is 60 cm^2. If the primary winding be connected to a 50Hz supply at 500V,

   Calculate :

   i) Peak value of flux density in the core and

   ii) The voltage induced in the secondary winding. **(6)**

OR

18. a) Explain the working principle of a three phase Induction motor. **(5)**

   b) Calculate the generated e.m.f. in the armature winding of a 4 pole lap wound dc machine having 728 conductors running at 1800 rpm. The flux per pole is 30 mWb. **(5)**

MODULE – 6

Answer **any one** full question :

19. With a neat sketch explain pipe and plate earthing. **(10)**

OR

20. a) With a neat sketch explain the working of a single phase ELCB. **(5)**

   b) Draw the schematic layout of a typical LT distribution board used in house wiring. **(5)**

_____

F

Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2016

EE100 BASICS OF ELECTICAL ENGINEERING
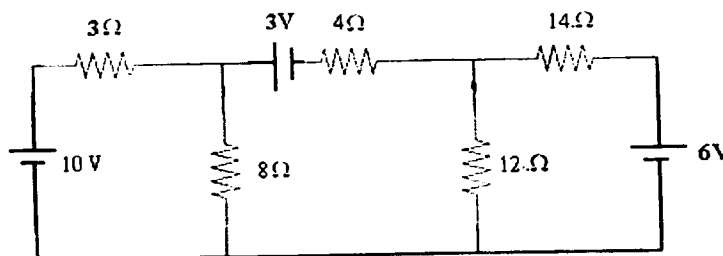
Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks

1. A 50 Ω resistor is in parallel with a 100 Ω resistor. Current in 50 Ω is 7.2A. What is the value of third resistance to be added in parallel to this circuit to make the total current 12.1 A.

2. Three resistors of 30Ω each are connected in delta. Obtain the equivalent star network.

3. Define MMF, magnetizing force, flux density, reluctance.

4. Define active, reactive & apparent power in an ac circuit with the help of power triangle.

5. Derive the relation between line and phase current in three phase delta connected system.

6. List the need for high voltage transmission system.

7. Explain the principle of operation of 3 phase induction motor.

8. Derive the emf equation of the transformer.

9. With neat sketch explain the working of fluorescent lamp.

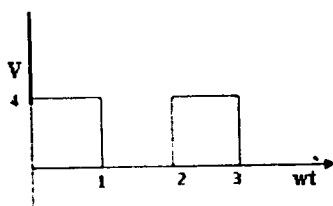10. Differentiate between simple and differential tariff.

PART B
MODULE (1-4)
Answer any four questions, each question carries 10 marks

11. a) State & Explain Kirchhoff's laws.   (4)
     b) For the circuit shown below, find current through 8Ω and 12Ω resistors.   (6)

12. a) Compare electric and magnetic circuit. (6)

b) A coil of insulated wire 500 turns and of resistance 4Ω is closely wound on iron ring. The ring has a mean diameter of 0.25m and a uniform cross sectional area of $700mm^2$. Calculate the total flux in the ring when a dc supply of 6V is applied to the end of the winding. Assume a relative permeability of 550. (4)

13. a) State and explain Faraday's laws and Lenz's law. (5)

b) Find the average and rms values for the given wave form. (5)

14. With neat phasor diagram, explain how power is measured in a 3 phase system by using 2 wattmeters. (10)

15. With a neat layout explain thermal power plant .Also list 4 advantages and disadvantages of hydel power plant. (10)

16. With the help of a single line diagram explain a typical power transmission system. (10)

MODULE 5
Answer any one full question

17. a) With neat diagram explain the construction of a dc generator. (5)

b) Maximum efficiency of a transformer occurs at unity power factor and at full load. If the full load copper loss is 60 W, calculate the total loss at full load, $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{3}{4}$ full load? (5)

OR

18. a) List 4 advantages of three phase transformers compared to single phase transformer

(4)

b) Explain different types of dc generators with respect to excitation and winding connection (6)

MODULE 6
Answer any one full question

19. What is the necessity of earthing. Explain with neat diagram, pipe earthing. (10)

OR

20. a) With neat diagram explain the working of mercury vapour lamp. (6)

b) "LED lamps are preferred now a days" give 4 reasons supporting this statement. (4)

10023

Reg. No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST/SECOND SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPT 2016
EE100 BASICS OF ELECTICAL ENGINEERING

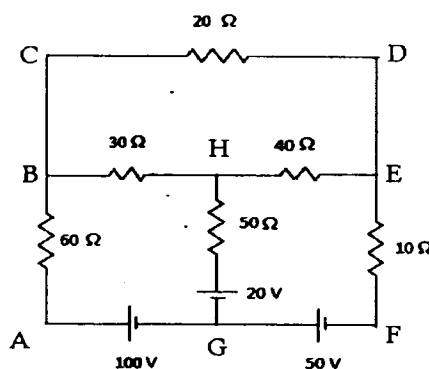Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks

1. State and explain Kirchhoffs law.
2. Three resistors $R_1=20$ Ω, $R_2=90\Omega$ and $R_3=10$ Ω are connected in star .Obtain the equivalent delta circuit.
3. Define coefficient of coupling in a magnetic circuit.
4. A 10Ω resistor & $400\mu F$ capacitor are connected in series to a 240V sinusoidal ac supply. The circuit current is 5A. Calculate the supply frequency & phase angle between current & voltage.
5. Explain the advantage of three phase system compared to single phase system.
6. Draw the single line diagram of a typical power transmission scheme.
7. Derive E.M.F. equation of a Transformer.
8. Explain the principle of operation of Universal motor.
9. Draw the schematic diagram of LT switch board.
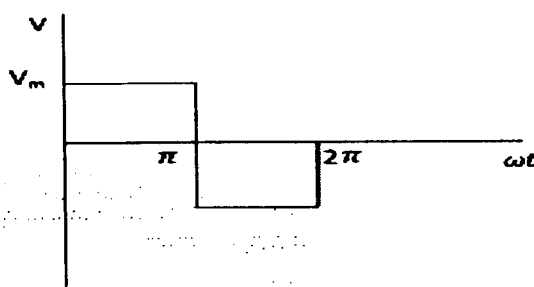10. Explain the working of MCB and ELCB

PART B
MODULE (1-4)
Answer any four questions, each question carries 10 marks

11. Calculate the current in each branch of the circuit shown using mesh analysis   (10)

12. a) An iron ring of mean length 50cm has an air gap of 1mm and a winding of 200 turns. If the relative permeability of iron is 300 when a current of 1A flows through the coil, find flux density. Take permeability of air as $4\pi \times 10^{-7}$ H/m. (5)

    b) Compare magnetic circuit and electric circuit. (5)

13. a) Determine average value & rms value of symmetrical square wave also find the form factor (6)

    b) Distinguish between self inductance and mutual inductance (4)

14. Three identical resistors of 20Ω each are connected in star to 415V, 50Hz three phase supply. Calculate (i) the total power consumed, (ii) total power consumed if they are connected in delta (iii) total power consumed, if one of the resistors is opened in both star connection and delta connections. (10)

15. With a neat schematic diagram explain Thermal power plant. (10)

16. Explain in detail the different equipment used in a substation. (10)

MODULE 5
Answer any one full question

17. The iron loss of 230/115V, 5KVA transformer is 200W. The copper loss at full load is 250W. Find efficiency of the transformer when delivering

    (i) full load power at unity power factor. (5)

    (ii) half full load power at 0.8 pf lagging. (5)

OR

18. Explain with neat diagram the construction and working principle of three phase induction motor. (10)

F

MODULE 6
Answer any one full question

19. a). Explain the necessity of earthing in electrical installation (4)

    b) With a neat sketch, explain the method of Plate Earthing (6)

OR

20. With the help of a diagram explain the principle of operation of compact fluorescent lamp and sodium vapour lamp.

    (10)

10026

F

Reg. No.:_____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: EC100

Course Name: BASICS OF ELECTRONICS ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 2 marks

1. Differentiate relays and contactors and write the applications of each.

2. What is tolerance of a resistor? Find the resistance range for the carbon resistor having the colour bands: yellow, violet, red and gold.

3. Write any four applications of electronics in the field of defence.

4. Draw the energy band diagrams of insulator, semiconductor and conductor.

5. How does an Avalanche breakdown differ from Zener break down?

6. Write the type number of the following: a) Low frequency low power transistor, b) High frequency low power transistor, c) Power Transistor, d) Rectifier Diode.

7. What is the working principle of SMPS?

8. Describe the role of different capacitors in RC coupled amplifier?

9. Define bandwidth of an amplifier and mark the important parameters in the frequency response graph.

10. Draw the internal block diagram of op-amp and write the functions of each block?

11. Realize the logic functions: Sum $S = A+B$ and Carry $C_Y = AB$ using gates and prepare the truth table.

12. What are the advantages of integrated circuits?

13. What is frequency modulation? Write the frequency bands used for AM and FM broadcast.

14. Write the RADAR range equation and list the factors affecting the range.

15. Distinguish between LEO, MEO and GEO satellites.

16. Discuss the basic principle of GPS.

17. Compare the features of GSM and CDMA.

18. Explain the total internal reflection in optical fiber with the help of a diagram.

19. What is the need for cell splitting in cellular communication system?

20. What are the characteristics of Plasma Display?

PART B

Answer any 8 complete questions each having 5 marks

21. Discuss the construction, working and application of electrolytic capacitor.

22. What is the basic working principle of transformer? List at least four different types of transformers and its applications.

23. Draw the VI characteristics of Zener diode and explain the principle of working.

24. Draw a sketch to show all the current components of an NPN transistor and derive the relation between currents.

25. Compare CB, CE and CC configurations of a transistor. Enumerate the applications of each configuration.

26. What is a full wave rectifier? Derive the expression for rectifier efficiency and ripple factor.

27. Draw the circuit diagram of a single stage RC coupled amplifier and explain the significance of each component.

28. Draw the circuit and explain the working of an inverting amplifier with op-amp and derive the expression for its closed loop gain.

29. Differentiate between analog and digital integrated circuits. Write at least four application specific integrated circuits from each group.

30. Draw the block diagram of a digital storage oscilloscope and specify the functions of each block.

Answer any 4 complete questions each having 5 marks

31. Define amplitude modulation. Draw the AM signal and its spectrum. Derive an expression for modulation index and total power in an AM signal.

32. What are the different types of RADARs and explain any one type with a block diagram.

33. What is satellite transponder? Explain its working with a block diagram.

34. Describe with the help of diagrams, how a call is established between two mobile phone subscribers.

35. Sketch the elements associated with an optical fiber communication system and describe the different types of optical fiber cables available for establishing the link.

36. Sketch the elements associated with a cable TV system and explain the functions of each.

2

Reg. No. : ....   **Name :** ....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016

EC100 : BASICS OF ELECTRONICS ENGINEERING

Max. Marks : 100   Duration : 3 Hours

PART – A

Answer **all** Questions. **Each** carrying **two** marks **each.**

1. Write any four applications of electronics in the field of medical science.

2. A carbon resistor has the colour bands: green, blue, red and gold. What is its resistance value ? Also, write the colour band sequence for $390 \pm 20\% \, \Omega$.

3. What is the difference between active and passive components ? Name at least two in each category.

4. A Germanium diode carries a current of 1mA at room temperature when a forward bias of 0.15V is applied. Estimate the reverse saturation current at room temperature.

5. Derive the relationship between α and β of a transistor.

6. Draw the symbol and write the general specifications of the following :
   a) Zener diode
   b) NPN transistor.

7. What is the need for feedback in oscillators ? Explain the criteria for sustained oscillation.

8. Define ripple factor and write the values for half wave, center tapped and bridge rectifiers.

9. Draw the block diagram of a public address system.

10. Define the terms CMRR and slew rate. Give its value for an ideal op-amp.

P.T.O.

11. Which are the universal gates ? Why are they called so ? Realize an AND gate using any one universal gate.

12. Draw the block diagram of a function generator and mark the output wave form of each block.

13. Why modulation is required in communication ?

14. Define percentage of modulation in AM and describe how the modulation index of AM wave evaluated from the waveform ?

15. Write radar range equation and specify the parameters used in the equation.

16. Why uplink frequency is different from downlink frequency in satellite communication ?

17. What is meant by frequency reuse in cellular communication ?

18. What are the major light sources used in optical fiber communication ?

19. Why FM preferred to AM for sound signal transmission in TV system ?

20. Describe the major features of HDTV system.

PART – B

Answer **any 8** Questions. **Each** carrying **five marks each**.

21. What is the basic working principle of transformer ? List at least four different types of transformers and its applications.

22. Draw and explain the construction of electrolytic capacitor. Write its general specifications and applications.

23. Plot the forward and reverse characteristics of a PN diode and discuss it.

24. Compare the three transistor configurations and write the applications of each.

25. Discuss the working principle of solar cell and photo diode and differentiate them.

26. With neat circuit diagram and waveforms explain the working of a bridge rectifier with capacitor filter.

27. Discuss the need for biasing in amplifiers. Explain the functions of each component in RC coupled amplifier with relevant waveforms. .

28. What is comparator ? Explain the working of an op-amp based comparator with circuit diagram and waveforms.

29. Explain the principle and working of a digital multimeter with block diagram and list the advantages over analog multimeter.

30. Draw the block diagram of a digital storage oscilloscope and specify the functions of each block.

PART – C

Answer **any 4** Questions. **Each** carrying **five** marks **each.**

31. Draw the block diagram of AM super heterodyne receiver and explain the functions of each block.

32. Draw and explain the block diagram of pulsed radar.

33. What are the satellite system link models ? Explain with neat diagram.

34. What are the major network switching subsystems in GSM and explain the functions of each.

35. With the help of block diagram, explain the working of an optical fiber communication system. What are the advantages ?

36. Explain the operation of CCTV with block diagram and mention its applications.

10026

Reg. No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2016

Course Code: EC100
Course Name: BASICS OF ELECTRONICS ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 2 marks

1. For the samples given below, specify the nominal value, tolerance, maximum and minimum value.

    a. A resistor coloured -yellow, violet, orange and gold

    b. A capacitor with code- 104K

2. Differentiate active and passive components. Name at least two in each category.

3. Write any four applications of electronics in the field of automobile.

4. How a potential barrier is created in an open circuited PN junction diode?

5. Why Silicon diode is more popular than Germanium? Mention its applications and cut-in voltage.

6. Draw the symbol and write the general specifications of the following

    a) Photo diode   b) PNP transistor

7. Define peak inverse voltage and write the values for Half wave, Centre tapped and Bridge rectifiers.

8. Draw the block diagram of a regulated power supply.

9. Compare positive and negative feedback.

10. What are the ideal characteristics of an op-amp?

11. What are the applications of CRO?

12. State and prove De-Morgan's theorem with truth table.

13. Modulation reduces the height of the antenna. Justify.

14 Define modulation index in AM and compute the percentage of modulation, when the maximum amplitude is 10V and minimum is 6V.

15. What is uplink and downlink in satellite communication? Which frequency is kept higher and why?

16. Write at least four important applications of RADARs.

17. What is hand-off in mobile communication and mention the types?

18. What are the major light detectors used in optical fiber communication system.

19. Why scanning and synchronizing is required in TV systems.

20. What is the need for cell splitting in cellular system?

PART B

Answer any 8 complete questions each having 5 marks

21. Discuss the construction, working and application of an electro-mechanical relay.

22. On what basis the capacitors are classified? List the different types of capacitors and discuss the operation of a variable capacitor?

23. Analyze the common emitter configuration of the transistor and derive the relation between α and β.

24. Draw and explain the experimental setup for obtaining the forward and reverse characteristics of a diode and plot the approximate graphs for silicon and germanium diodes.

25. Differentiate intrinsic and extrinsic semiconductors and discuss the formation of PN junction.

26. With neat circuit diagram and waveforms explain the working of a centre tapped full wave rectifier with capacitor filter.

27. Draw and explain the block diagram of a public address system.

28. What are oscillators? List the types and principle involved. Explain the working of any one oscillator with circuit diagram.

29. Draw the circuit and explain the working of a non-inverting amplifier with op-amp and obtain the expression for its closed loop gain.

30. Draw the block diagram of a digital storage oscilloscope and specify the functions of each block.

Answer any 4 complete questions each having 5 marks

31. Draw the block diagram of AM receiver and explain the functions of each block with waveforms.

32. What is GPS? Explain how GPS tracks the position?

33. Explain with a block schematic of the transponder used in satellite and list the band of frequencies used for different applications.

34. How does a GSM network connect people around? Describe the sequence of operations and components involved.

35. Explain optical communication with the help of block diagram and list the merits and demerits.

36. Describe a typical HDTV system with block diagram.

F

10030

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPT 2016

Course Code: EC100

Course Name: BASICS OF ELECTRONICS ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 2 marks

1. Draw the symbol and write the general specifications of the following
   a) Resistor
   b) Loudspeaker

2. Write any four applications of electronics in the field of medical science.

3. What is inductance? Give at least two applications of inductor?

4. Differentiate between intrinsic and extrinsic semiconductors

5. What is base width modulation in a transistor?

6. Write the type number of the following
   a) Medium power transistor
   b) High frequency low power transistor
   c) Power transistor
   d) Silicon diode

7. What is the role of filters in rectifiers? List the different types of filters.

8. What is the need of biasing in transistor circuits?

9. What is the need for feedback in oscillators? Explain the criteria for sustained oscillation?

10. What are the advantages of DSO over analog CRO?

11. Write the truth table and symbol for EX-NOR gate and EX-OR gate.

12. Compare the characteristics of ideal and real op-amps.

13. What is the frequency deviation and modulation index for FM

14. Compare AM and FM.

15. What are the elements of a satellite transponder?

16. What are the merits and demerits of GEO satellites?

17. Distinguish between HLR and VLR in GSM.

18. Why the refractive index of core in optical fiber is greater than cladding.

19. Write the advantages and disadvantages of optical communication.

20. What are the merits of DTH over cable TV?

PART B

Answer any 8 complete questions each having 5 marks

21. Discuss the colour coding scheme of capacitors? Write the colour band sequence for the capacitance 470 pF?

22. With a neat figure, explain the construction of a carbon film resistor and mention its features.

23. Explain the working principle of LED? Explain the generation of different colours in LED with example.

24. Draw the output characteristics of a PNP transistor in CE mode and explain the three regions of operation.

25. Explain the principle of working of a Zener diode? Differentiate between Zener and Avalanche breakdown mechanisms?

26. Draw the circuit diagram of RC phase shift oscillator. How does the circuit satisfy the Barkhausen criteria?

27. Explain the operation of a bridge rectifier with circuit diagram and show that the ripple factor is 0.48.

28. Explain the operation of RC coupled amplifier with circuit diagram and frequency response.

29. State and explain De-Morgan's theorem.
Realize the Boolean expression $X = AB + \overline{B}C$ using any one of the universal gates and write the truth table.

30. Draw the block diagram of a function generator and specify the functions of each block.

Answer any 4 complete questions each having 5 marks

31. Draw the block diagram of FM receiver and explain the functions of each block with waveforms.

32. Draw the block diagram of a RADAR and describe the method for measuring the range of an object.

33. Briefly explain satellite communication system with a block diagram.

34. What is the principle of operation of GSM? What are the services offered by GSM

35. Sketch the elements associated with an optical fiber communication system and describe the major light detectors.

36. With illustrations, explain the working of plasma display and mention its advantages and disadvantages.

2

D

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE101-01

Course Name: INTRODUCTION TO CIVIL ENGINEERING

Max. Marks: 100

Duration: 3 Hours

Part A

Answer ALL questions. Each question carries 1 mark

1. What is a retaining wall?
2. What is the minimum compressive strength of brick?
3. List out the grades of Ordinary Portland Cement.
4. Which is the strongest bond in brickwork?
5. What is the full form of TMT steel?
6. Write any one relevant factor for selecting suitable flooring material

Part B

Answer ALL questions. Each question carries 5 marks

7. a) List out the various building components of your house   (2)

   (b) Give the functions of any three building components.   (3)
8. List out the various types of tiles used in civil engineering.   (5)
9. What are fine aggregates and coarse aggregates?. Write a laboratory test for assessing the grading of aggregates.   (2+3)
10. Draw the plan and elevation of (a) One and half brick wall (b) Two brick wall, in English bond

          (2.5+2.5)
11. What are the uses of mild steel?   (5)
12. What are the different types of roofing material?   (5)

Part C

Answer Any 3 questions. Each question carries 6 marks

13. Explain setting out of a building
14. Classify the types of buildings as per National Building Code of India
15. Discuss the various tests conducted on roofing tiles.

16. Explain the classification of stones.

17. Explain (a) Fineness test of cement (b) Initial and final setting time test of cement   (3+3)

18. Sketch the flow diagram in dry process of manufacture cement   (6)

19. What are the essential features of English bond?   (6)

20. Compare brick masonry and stone masonry?   (6)

Part D

21. (a) What is meant by seasoning of timber?   (2)

     (b) Explain three different methods of seasoning.   (5)

22. Discuss any seven defects occurring in timber.   (7)

23. Sketch and explain any three structural steel sections   (7)

24. What are the different flooring materials and factors affecting its selection?   (7)

25. List out seven advantages and disadvantages of flat roof.   (7)

D

10108

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2016

Course Code: BE101-01

Course Name: INTRODUCTION TO CIVIL ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 1 mark

1. The discipline of civil engineering that deals with purification of drinking water and waste water disposal   is _____.

2. How igneous rocks are formed?

3. Which cement is ideal for under water construction?

4. What is a brick bat?

5. What is seasoning of timber?

6. Define span of a roof.

PART B

Answer ALL questions. Each question carries 5 marks

7. Explain setting out of a building.

8. Describe any 3 tests conducted on stones.

9. Give reasons for the following: (i) During the grinding of cement a small quantity of gypsum is added (ii) The proportion of lime in cement is to be carefully maintained   (2.5 marks each)

10. Make a short note on Random rubble masonry.

11. What are the defects found in timber?

12. Write the criteria for selection of roofing materials.

PART C

Answer Any Three questions. Each question carries 6 marks

13. Draw a neat section of a residential building showing various components?

14. Classify the types of buildings as per National Building Code of India.

15. Describe about the classification of bricks.

16. What are the qualities of a good building stone?

Answer Any Three questions. Each question carries 6 marks

17. Explain with a schematic diagram, the different steps involved in wet process for the manufacturing of cement.

18. Explain the different tests for coarse aggregates.

19. Draw the plan and elevation of (a) One brick wall (b) One and half brick wall (c) Two brick wall, in English bond.   (2 marks each)

20. What are the different types of ashlar rubble masonry?

PART D

Answer Any Four questions. Each question carries 7 marks

21. Compare the characteristics of soft wood and hard wood in timber.

22. Sketch and explain any three structural steel sections.

23. Compare different aspects of natural seasoning and artificial seasoning.

24. What are the different flooring materials and explain factors affecting choice of flooring material?

25. Explain the different types of sloping roofs with neat diagrams.

Reg. No.:_____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. Distinguish between the terms 'entropy' and 'enthalpy'.
2. List out different applications any one of turbo machines.
3. When you purchase an air conditioning unit, one of its specifications is given in TR. What does this mean?
4. Give any 3 different classifications of automobiles.
5. Apply Grashof's law to any 4-bar mechanism.
6. Define the term mechanical advantage.
7. Mention any 3 applications of composites.
8. Name any three alloys and give their applications.

PART B

Answer any 2 complete questions from each module.

MODULE 1 *(6x2 = 12 Marks)*

9. A) What is irreversibility? What causes it?

   B) State Clausius inequality and its significance

10. State Kelvin Plank and Clausius statements of second law of thermodynamics and give their physical significance.

11. List any three renewable power sources and compare their advantages and disadvantages

MODULE 2 *(6x2 = 12 Marks)*

12. With help of a neat sketch explain working of a four stroke diesel engine.

13. A) Write 3 significant events in the history of development of modern steam turbine.

    B) List the applications of gas turbines

14. Differentiate between impulse and reaction turbines

MODULE 3 *(6x2 = 12 Marks)*

15. Give 6 different applications of refrigeration.

16. What are the different psychrometric operations in an air conditioning system?

17. With help of a diagram explain working of an All-water air conditioning system

MODULE 4 *(6x2 = 12 Marks)*

18. Write a short note of current scenario of Indian automobile sector.

19. What are the major components of an automobile? Give special emphasis to their function.

20. Give the different types of air craft engines and their applications

MODULE 5 *(7x2 = 14Marks)*

21. Distinguish between planer, spherical and spatial mechanisms with help of suitable examples.

22. Explain 6 different kinds of kinematic pairs giving examples to each one of them.

23. Give an account of different types of loads considered during design of a machine element.

MODULE 6 *(7x2 = 14Marks)*

24. Discuss about any three different types of manufacturing methods that are practiced nowadays.

25. With help of block diagram explain the philosophy of Computer Integrated Manufacturing

26. What do you understand by lean production and agile manufacturing?

D

PART A

Answer ALL questions. Each question carries 3 marks

1. State two classical statements of second law of thermodynamics.

2. List the broad classification of air compressor and give the application of each type.

3. List the application of refrigeration in construction industry.

4. What is meant by chassis of an automobile?

5. Define the following : (i) Rigid Body, (ii) Resistant Body

6. What is Grashof's law?

7. Differentiate between BCC and FCC structures.

8. Give any three advantages of composites.

PART B

Answer any 2 complete questions from each module

MODULE 1

9. Define the terms (a) Thermodynamic System, (b) State, (c) Process, (d) Control mass (e) Control volume (f) Control surface   (6)

10. Explain first law of thermodynamics, its limitations and how these limitations are addressed by the second law of thermodynamics.   (6)

11. a) A man inside a closed room switched on the ceiling fan hoping to reduce the temperature of the room. Is his intuition justified thermodynamically? Give reason for your answer.   (3)

    b) The use of electric heaters to heat up living spaces in colder countries is said to be thermodynamically inefficient. Discuss the reason.   (3)

MODULE 2

12. List the various components of IC engine and their functions with the aid of a neat diagram. (6)

13. Explain the working of two stroke CI engine with neat sketch. (6)

14. a) Differentiate between Solid Propellant Rockets and Liquid Propellant Rockets? (3)

    b) Discuss the recent (last decade) space programmes of ISRO? (3)

MODULE 3

15. What are the different methods of food preservation? Which is the best method?(6)

16. Explain the components of Air conditioning systems. (6)

17. a)Give 3 historically significant inventions in the development of refrigeration. (3)

    b) What are the different types of refrigerated storages? (3)

MODULE 4

18. List the major components required to transmit power from the engine to an automobiles wheels. Mention the function of each component. (6)

19. a)Differentiate between Front wheel drive, Back wheel drive and All wheel drive in automobiles. (3)

    b) List the various applications of automobiles. (3)

20. a)What is aerodynamics? (2)

    b) Compare turbo prop and turbo jet engines (4)

MODULE 5

21. Define machine, mechanism and structure. Give examples for each. (7)

22. Explain the different types of load considered for engineering design purpose. (7)

23. Define link, pair and kinematic chain. Differentiate between kinematic chain and mechanism. (7)

MODULE 6

24. Explain the classification of engineering materials. (7)

25. List any 4 material testing methods and their applications. (7)

26. Explain computer integrated manufacturing and its applications. (7)

10116

Reg. No. _____   Name_____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE101-03

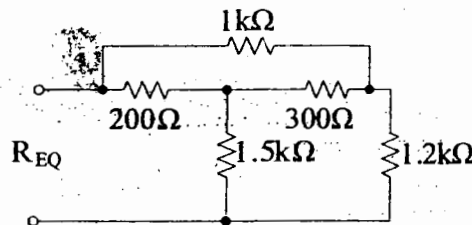**Course Name: INTRODUCTION TO ELECTRICAL ENGINEERING**

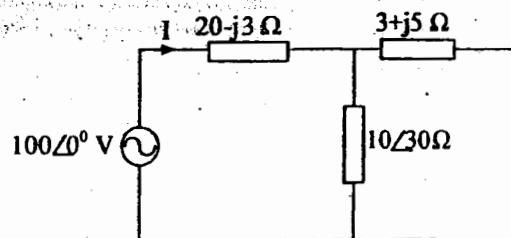Max. Marks: 100   Duration: 3 Hours

Instructions: Make suitable assumptions if any data is missing
Write units in all numerical answers

PART- A
Answer all Questions. 10x4 = 40 marks

1 Draw and explain the characteristics of ideal and practical voltage and current sources.

2 Using star-delta transformations, find the total resistance R_{EQ} for the circuit shown below.

3 What is fringing effect and leakage flux in magnetic circuit? What are its disadvantages?

4 An alternating current is represented by $i(t) = 200sin(314t)$. Find (i) RMS value (ii) frequency (iii) time period and (iv) instantaneous value of voltage when $t = 3msec$.

5 From the figure shown below, (i) evaluate current 'I' flowing through the circuit and (ii) draw the phasor diagram of current and voltage (take source voltage as reference quantity).
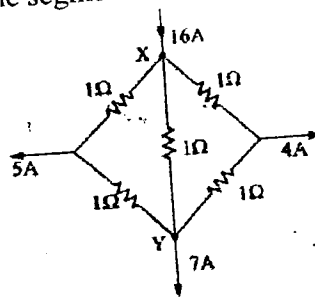

6 A choke coil takes 3A which is lagging 60^0 with respect to applied voltage of 230 V, 50 Hz AC supply. Determine impedance, resistance and inductance of coil.

7 List a few advantages of three phase system over single phase system.

8 Three impedances $(10+j15)$ Ω are connected in delta across three phase 400 V supply. Find the line current, power factor and active power.

9 Explain the necessity of earthlings in electrical installations
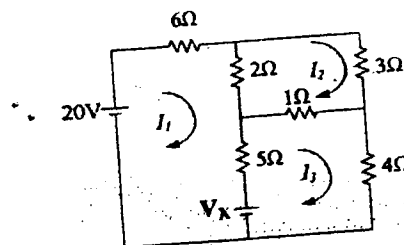
10 Draw a schematic layout of LT switch board.

1

Answer any four full Questions 4x10 =40 marks
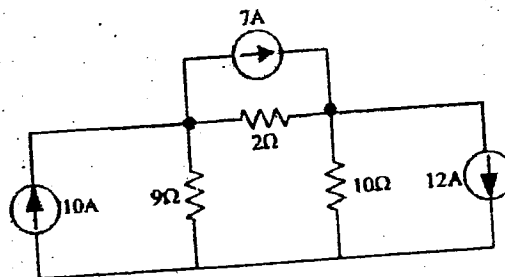
11 a. Compute current through the segment X and Y shown in the figure below.   (4)

b. Determine unknown voltage V_X. given in the figure, so that the current supplied   (6)
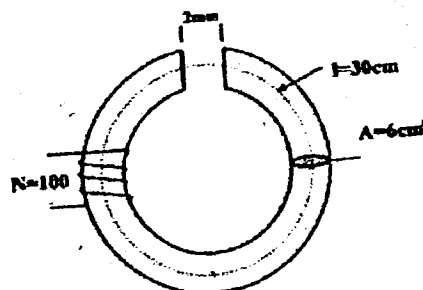by the 20V source is zero

12 a. Using nodal analysis, find power consumption of 10 Ω resistor in the circuit   (7)
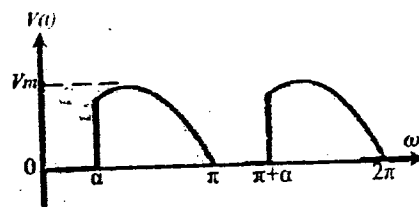given below

b. What are the dissimilarities of electric and magnetic circuits?   (3)

13 a. An iron ring of cross sectional area 6 cm² is wound with a wire of 100 turns and the   (6)
ring has a saw cut of 2 mm shown below. Calculate the magnetizing current
required to produce a flux of 0.1 mWb if mean length of magnetic path is 30 cm
and relative permeability of iron is 470.Neglect magnetic leakages and fringing.

b. Derive the expression of coefficient of coupling in terms of mutual inductance and   (4)
self-inductance.   2

14 a. The output voltage appearing across an electronic power converter is shown in (6) figure. Find RMS and average value of $v(t)$ if $Vm = 100$ V and $\alpha = 60^\circ$
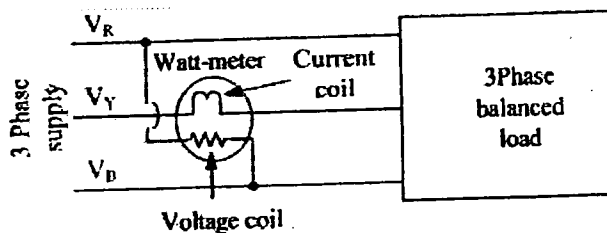

b. Explain how sinusoidal voltages and current are represented in phasor form (4)

15 a. Express the phasor in time domain '$i(t)$' after carrying required computation in (5) phasor form $I = \dfrac{(4e^{-j\pi/12} - 3e^{j\pi/8})}{(2\angle -25)(2 - j2)}(15 + j1.2)$

b. Sketch how the parameters of a series RLC circuit vary with frequency. Define 'Q' (5) Factor and bandwidth of a series resonant circuit?

16 a. Prove the instantaneous power consumed by a pure inductor is zero. (3)

b. A series RLC circuit with L=25 mH and C = 70 µF has a lagging phase angle (7) 30^0 at f =320 Hz. At what frequency will the phase angle be 40^0 leading

PART- C
Answer two full Questions (17 or 18 and 19 or 20)

17 a. The Power input and line current of three phase induction motor is 15 kW and (6) 25A respectively. Find the readings of two watt meters connected to measure the motor input power. Assume three phase supply voltage is 400V

b. Explain phase sequence of three phase system. (4)

OR

18 a. Figure below shows a watt meter connection in a three phase balanced load is (6) connected to balanced three phase supply. Prove that wattmeter reading is proportional to reactive power consumed by the load.

b. Derive the line and phase voltage relationship in a star connected three phase (4) circuit with the help of phasor diagram.

19 With neat sketch, explain the method of standard pipe earthing. (10)

OR

20 Explain briefly, various protective devices used in LT installations (10)

D

PART- A

(Answer all Questions. 10x4 = 40 marks)

1.   Identify and explain the source given in the figure below within the dotted line.   (4)
Given V=1.5V and R=1Ω, find the value of current I_0 and voltage V_0 across R_L
for the following values of $R_L = 0.1, 0.5$ and $1.0\ \Omega$.

2.   List a few similarities and dissimilarities of magnetic and electric circuits.   (4)
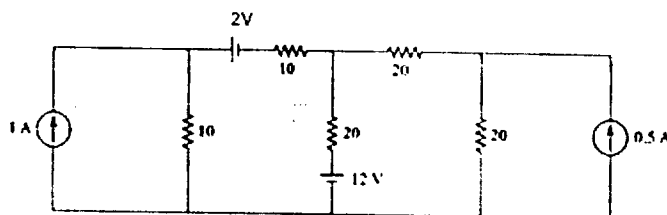
3.   A 50 cm long conductor moves with a velocity of 2 m/s at right angles to itself   (4)
and a uniform magnetic field of $1 Wb/m^2$ flux density. Calculate the voltage
induced between the ends of the conductor. What will be the voltage if the
conductor is moving at 30^0 from the direction of the flux?

4.   A capacitor of capacitance 79.5 μF is connected in series with a non-inductive   (4)
resistance of 30 Ω across 100 V, 50 Hz supply. Find (i) impedance (ii) current
(iii) phase angle and (iv) equation for instantaneous value of current.

5.   The voltage across 150 Ω resistor is 150 $\sin(2\pi\times10^3 t)$ V. At what value of 't'   (4)
does the current through the resistor equal to -0.26 A and what is instantaneous
power at this time t ?

6.   What is resonant frequency? Give a graphical explanation of series resonance in   (4)
series RLC circuits.

7.   What are the advantages of three phase system over single phase system?   (4)

8.   How do you measure 3phase reactive power in a balanced 3 phase system using   (4)
one Wattmeter?

9.   What is the role of a MCB in domestic wiring circuit? Also explain the working   (4)
of MCB

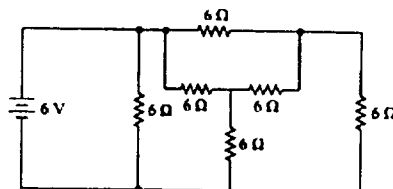10   Explain the necessity of earthing in electrical appliances   (4)
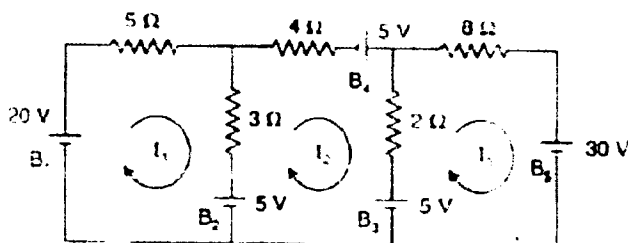
PART- B

Answer any four full Questions

11 a.   Using Nodal Analysis find the currents flowing through the various branches in   (6)
the circuit shown in figure below.

b.   Calculate the current supplied by the battery in the circuit shown in figure below   (4)

12 a.   Using mesh analysis, determine the current supplied by each battery in the circuit   (6)
shown in figure.

b.   Drive the expression for coefficient of coupling (K) between two magnetically   (4)
coupled circuits.

13   Calculate the current required to be passed through the central limb winding so as   (10)
to produce a flux of 1.6 mWb in this limb. Length of iron in the central limb is
15 cm. Cross sectional area of the central limb is 8 cm^2 and that of outer limbs
4 cm^2. The mean length of iron of the outer limb is 32 cm each. Given that for
iron, for a flux density of 2.0 Wb/m^2, the value of H is 800 AT/m.

14   Find the average value and r.m.s value of the waveform given below.   (10)

15 a. Explain how sinusoidal voltages and currents are represented as phasor? (4)

b. A Coil of resistance 50 Ω and inductance 100 mH is connected in series with a (6) capacitor of 500 μF is connected across a 230 V, 50 Hz ac supply. Find (i) Current through the coil (ii) Power consumed (iii) Reactive power and (iv) Voltage across the coil. Also draw the phasor diagram with voltage as the reference vector.

16 a. Prove the instantaneous power consumed by a pure capacitor is zero. (4)

b. A series LCR circuit which resonates at frequency 500 kHz has L=100 μH, (6) R=25Ω and C=1000 pF. Determine (i) the Q-factor of the circuit (ii) the new value of C required to resonate at 500 kHz when the value of L is doubled and the new Q factor.

PART- C

Answer two full Questions (17 or 18 and 19 or 20)

17 a. Derive the relation between Line and Phase Values of Voltage and Current for a (4) delta connected system.

b. The load to a three phase power supply consists of three similar coils connected (6) in star. The line currents are 25A and the kVA and kW inputs are 20 and 11 respectively. Find (i) the phase and line voltages (ii) the reactive power input (iii) the resistance and reactance of each coil.

OR

18 a. What is meant by phase sequence of a 3 phase system? (3)

b. Three identical coil having resistance of 10 Ω and an inductance 38.2 mH are (7) connected in delta across 400 V, 3 phase 50 Hz supply. Find wattmeter reading if two Wattmeter method is used to measure total power.

19 With a neat sketch explain plate earthing indicating standard dimensions. (10)

OR

20 a. If an earth leakage is occurred in a domestic installation, which protective device (5) will act? Explain the working of that device.

b. Give the schematic Layout of an LT Switch Board. (5)

3

D

10122

Reg. No.:_____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE101-04

Course Name: INTRODUCTION TO ELECTRONICS ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 2 marks

1. Color band sequence on a resistor is Yellow, Violet, Silver and Red. What is its resistance value?
2. What is the working principle of transformer?
3. A number 104 is written on the body of a ceramic capacitor. What is the value of capacitance?
4. Draw piecewise linear model of diode.
5. Differentiate between Zener and avalanche breakdown.
6. A Silicon diode has reverse saturation current of 2.5μA at 300K. Find forward voltage for a forward current of 10Ma.
7. Discuss the role of bypass capacitor in a single stage RC coupled amplifier?
8. The widely used voltage amplifier configuration is CE, mention the reason?
9. Derive the relationship between α and β.
10. Draw the equivalent circuit of a UJT.
11. Write 4 advantages of FET over BJT.
12. How FET functions as voltage variable resistor?
13. Why is the ripple factor of HWR higher than that of FWR?
14. Design a silicon diode clipper for transfer characteristics in figure below?

15. Assuming drop across diode is 0.6V, find output voltage V_0?

16. Find the maximum and minimum values of Zener diode current.

17. A CRO is set to a time base of 0.1ms/div with a 2V/div amplitude. Sketch the display of a pulse signal waveform with a frequency 1kHz and amplitude 8V peak.

18. What is precision and resolution of measuring instruments?

19. Compare an analog multimeter with a digital multimeter.

20. How testing of a diode is carried out?

PART B

Answer any 4 complete questions each having 10 marks

21. Differentiate the capacitors based on the types of dielectric used and explain their construction.

(10)

22. A) Explain the constructional details of carbon composition resistors?   (5)

   B) Explain the formation of a potential barrier in a p-n junction and show the polarity of the Barrier potential.   (5)

23. A) Explain the working of an RC coupled amplifier with a neat circuit diagram.   (6)

   B)   Explain the frequency response curve.   (4)

2

24. A)With reference to the following circuit, draw the load line and mark the Q point of a Silicon transistor operating in CE mode based on the following data ($\beta = 80$, Rs= 47kΩ, RL= 1kΩ,neglect I_{CBO})

(6)

B) Sketch the forward characteristics of a SCR. Explain the importance of Holding current in a SCR. (4)

25. With a neat diagram draw structure of n channel E-MOSFET and explain different regions of operation. (10)

Answer any 2 complete questions each having 10 marks

26. A)Draw the circuit of a bridge rectifier and explain its working. (5)

B) Derive the expressions for V_{rms}, V_{dc}, Ripple factor, Rectification Efficiency, Peak Inverse Voltage. (5)

27. A) With the help of suitable block diagram, discuss the working principle of the electronic device which is used in laboratories for generating the various standard waveforms. (5)

B) Draw the block diagram of DC power supply and list out the functions of each block. (5)

28. With neat schematic diagram, explain the working of a CRO. List its applications. (10)

D

10123

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2016

Course Code: BE101-04

Course Name: INTRODUCTION TO ELECTRONICS ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 2 marks

1.   Find out the max current rating for a 10k ohm, 0.5 W resistor.

2.   In a particular circuit, a resistor was used with colour band Gray, Red, Black, Gold in respective order and a ceramic capacitor with marking 224. Identify the value of resistance and capacitance.

3.   What is the main difference between trimmer and Gang capacitor?

4.   Why do LEDs emit light while ordinary diodes do not?

5.   Assume that the diode is initially at room temperature (27^0 C). Show the effect of temperature on the V-I characteristics, if the same diode is placed at a temperature of (75^0C)

6.   Analyze the importance of forbidden gap in determining the nature of conduction of a material.

7.   In BC 107 transistor, B and C stands for what?

8.   What is thermal runaway and how does this affect a transistor?

9.   CC configuration is used mainly for impedance matching. Give reason.

10.   Define the three FET parameters gm, rd and μ. Prove that μ =gm x rd

11.   Why is JFET called as a Voltage Variable Resistor and which region of V-I curve is used for this purpose?

12.   When does a UJT behaves as a diode?

13.   Sketch the load line for the diode network shown in the figure. Also find the voltage across the resistor

14.   An input of $10\sin(100\pi t)$ volt is applied to a diode circuit. The output obtained from the circuit is $10+10\sin(100\pi t)$ volt . Assume the diode is ideal. Draw the appropriate circuit.

15.   Capacitor filter is not suitable for heavy loads. Give reason.

16. Design a circuit to obtain the following transfer characteristics.

17. What are the advantages of a SMPS over a linear voltage regulator?

18. What is the need for electron gun in CRO?

19. Draw the block diagram of digital Multimeter.

20. A sinusoidal waveform is displayed on CRO screen with one full cycle in two divisions. If the time-base knob is 0.5 ms position, find the frequency of the waveform.

PART B

Answer any 4 complete questions each having 10 marks

21. a) Discuss the working and various parameters of relays with relevant sketches. (5)

    b) Explain the constructional features of metal film resistor. (5)

22. a)Describe the construction of a commercial electrolytic capacitor. (5)

    b)Which diode is called tuning diode and why? (5)

23. a) Draw the circuit diagram of an RC coupled amplifier. (5)

    b) Give reason for the drop in gain in the frequency response of RC coupled amplifier at lower frequencies and higher frequencies. (5)

24. a)Why stabilization of operating point is necessary in a transistor? (3)

    b) List the main differences between a FET and a BJT. (3)

    c)Determine the dc bias voltage VCE and the current IC for the voltage divider configuration shown in the following figure:

    (4)

25. Give the construction details of an FET and qualitatively analyse, how the current flow from drain to source is controlled by the voltage applied at the gate terminal. (10)

26. a) Calculate α_{dc} and β_{dc} for a transistor if IC is measured as 1mA, and IB is 25μA. Also determine the new base current to give IC = 5mA. (4)

b) Explain the working of the given circuit and Sketch Vo and transfer characteristics for the input shown. (6)

27. a) Draw the block diagram of a function generator. (4)

b) A 5 kΩ load is fed from a bridge rectifier connected across a transformer secondary whose primary is connected to 460V, 50 Hz supply. The ratio of number of primary turns to secondary turns is 2:1. Calculate d.c load current, d.c load voltage, ripple voltage and PIV rating of diode. (6)

28. Mention the procedure for checking the following devices: a) UJT b) SCR c) JFET d) BJT e) capacitor (10)

10126

D

Reg. No.:_____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE101-05

Course Name: INTRODUCTION TO COMPUTING AND PROBLEM SOLVING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks (40 Marks)

1. a) Name any 3 optical input devices.
    b) Name the different I/O ports used in a computer.
    c) Define system software with an example.   (1 each)
2. Write notes on buses.   (3)
3. Draw the flowchart to find out the greatest of three numbers.   (2)
4. Differentiate between top down and bottom up problem solving strategies.   (2)
5. Write an algorithm to compute sum of the series $1 - \frac{x^2}{2} + \frac{x^4}{4} - \frac{x^6}{6} + \cdots \ldots \ldots \ldots .n$ terms.   (2)
6. a) Which of the following is a valid variable name in Python? (i) 12xyz (ii) break (iii) A_123
    (iv) A?B?C
    b) Evaluate the expression x**y**z given x=2,y=3,z=2 .
    c) Predict the output of following code:
       for i in range(10,-1,-2):
       print i   (1 each)
7. Write a Python program to find the sum of all even terms in a group of n numbers entered by
    the user.   (3)
8. Show how you will use the cosine() and log() functions in your program with the help of an
    example.   (2)
9. What will be the output of this program? Briefly explain the working of this code.   (2)
    def check(x,y):
    if y==0:
    print 'error'
    return
    else:
    return x/y
    a,b=10,5
    print check (a,b)
10. Write a Python program to compute the nth fibonacci number. Use a recursive function for the
    implementation.   (2)
11. Let fruit='apples' be a string. What will be the output of the following expressions: (2)
    i) len(s1) (ii) s1[0:4] (iii) s1[6] (iv) s1[-4]
12. Let Data represent the list ['circle','square','triangle']. Write the expressions for following
    operations: (3)

i) Replace the value 'circle' with 'ellipse'

ii) Add a new value 'rectangle' top end of list

iii) Remove the values 'square' and 'triangle' from list.

13. Let farm={'Sheep':5,'Cows':2,'Goats':10} be a dictionary. Write the statements for following operations. (3)

   i) To add the key value pair ('Ducks':8)

   ii) To display the number of items in the dictionary.

   iii) To remove the key value pair ('Cows':2)

14. Write the syntax for opening a file in Python. Give one example. (2)

15. What do you mean by pickling in Python? Explain its significance with the help of an example. (3)

16. When does an exception occur during program execution? How are exceptions handled in Python? Explain with examples. (3)

PART B

Answer any 4 complete questions each having 8 marks

17. (a) Draw and explain the instruction execution cycle in a computer. (4)

   (b) Write notes on OMR, MICR, and OCR devices. (4)

18. Give the algorithm and flowchart for finding the largest and smallest numbers in a given list of N numbers. (8)

19. (a) Differentiate between break and continue statements with proper examples. (3)

   (b) Write a Python program to display all Armstrong numbers in a given range. (5)

20. (a) Write a Python program to count the number of zeros and negative terms in a given set of n numbers. (4)

   (b) Write a Python program to find the sum of digits of a number using functions(preferably a recursive function). (4)

21. (a) Why do we need functions? What are the advantages of using a function? (3)

   (b) Write a Python program to simulate a menu driven calculator with addition, subtraction, multiplication, division and exponentiation operations. Use a separate function to implement each operation. (5)

Answer any 2 complete questions each having 14 marks

22. (a) What do you mean by mutability of a data structure? Explain with the help examples, why we say that lists are mutable while tuples are immutable. (3)

   (b) Write a Python program to count number of vowels, consonants, words and questionmarks in a given string. (6)

   (c) Write a Python program to input a list of n numbers. Calculate and display the average of numbers. Also display the cube of each value in the list. (5)

23. (a) Write a Python program to create a dictionary of roll numbers and names of 5 students. Display the contents of dictionary in alphabetical order of names. (7)

2

(b) Write a Python program to create a text file and to input a line of text to it. Display the line of text with all punctuation marks removed.   (7)

24. (a) Define the terms class, attribute, method and instance with the help of an example.   (4)

(b) Create a class Car with attributes Model, year and price and a method cost() for displaying price. Create two instances of the class and call the method for each instance.   (5)

(c) Write a Python program to create a file containing 10 numbers. Read the contents of the file and display the square of each number.   (5)

D

10128

Reg. No.:_____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2016

Course Code: BE101-05

Course Name: INTRODUCTION TO COMPUTING AND PROBLEM SOLVING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions

1. Differentiate features of RAM and ROM   (3)

2. Describe Instruction cycle and its steps.   (3)

3. Write the algorithm for finding largest among set of N numbers   (2)

4. What is the purpose of flow charts in problem solving? Describe symbols used in flow chart (2)

5. Draw the flow chart for finding whether the given number is odd or even   (2)

6. for count in range(100):
    print count
    Convert the above code to equivalent while loop   (3)

7. Write a python code to print the following pattern

    1

    2   3

     4 5 6   (3)

8. Write a function to find the sum of numbers between a lower bound and upper bound   (2)

9. Illustrate with suitable example Type conversion and Type coercion   (2)

10. List the advantages of using functions in program   (2)

11. Write a Python code to check whether two strings are equal or not   (2)

12. Describe the Dictionary methods with example   (3)

13. Write a Python code to search an element in a list   (3)

14. Why exception handling is required in programming?   (2)

15. Differentiate Shallow equality and Deep equality   (3)

16. List the advantage of using pickling in python. Also state the usage of dump method with suitable examples   (3)

PART B

Answer any 4 complete questions each having 8 marks

17. a)Describe the memory hierarchy in terms of cost, speed and storage   (5)

b) What are the translator softwares used for converting a program written in a high-level language to object code? How are they different from each other?　　　　(3)

18. Write the algorithm and flow chart to find the sum of digits of a number　　　　(8)

19. Explain the difference between definite Iteration and indefinite(infinite) iteration. Give example programs for illustrating each type　　　　(8)

20. a) Write a program to generate Fibonacci series upto a limit　　　　(4)

　　b) What is recursion? Write a recursive function to find the factorial of a number.　　　　(4)

21. Write a Python program using function to check the type of a triangle (Scalene, Isosceles, Equilateral) by getting the vertices from the user.　　　　(8)

Answer any 2 complete questions each having 14 marks

22. a) Write a Python code to add two matrices using list　　　　(8)

　　b) Write a Python program to reverse a string and print whether its palindrome or not.　　　　(6)

23. a) A book shop details contains the Title of book and Number of copies of each title. As books are added to shop the number of copies in each should increase and as books are sold the number of copies in each should decrease. Implement this scenario using Dictionary data type in Python　　　　(7)

　　b) Describe the use of try-except method in Python with suitable illustration.　　　　(7)

24. a) Write a python code to read a text file ,copy the contents to another file after removing the blank lines　　　　(8)

　　b) Write notes on Class, Attributes and Instances with suitable examples for each.　　　　(6)

10129

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPTEMBER 2016

Course Code: BE101-05

Course Name: INTRODUCTION TO COMPUTING AND PROBLEM SOLVING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions

1. Von Neumann Architecture uses Stored Program concept. What do you infer from this statement? (3)

2. Which are the parameters used for rating the performance of a computer? (3)

3. Draw a flowchart to find given number is odd or even. (2)

4. List the symbols used in flowchart and describe where each one is used. (2)

5. Write an algorithm to display even numbers in reverse order starting from 50 to 0. (2)

6. Give the syntax for if statement in python. Explain how alternative execution and chained conditionals performed in python with examples. (3)

7. Given,

    a=6

    b=7

    c=42

    Evaluate the following expressions

        Print 1, not a==7 and b==7

        Print 2, not(a==7 and b==6)

        Print 3, not a==7 and b==6 (3)

8. Which of the following is *not* a reason to use a function in your program? Justify your answer.

    a) To break a program into pieces that make sense

    b) To make your program run faster

    c) To produce code that will perform the same action many times but with different values each time

    d) To place repeated code in one place so it can be reused (2)

9. What is the difference between type conversion and coercion in Python? Give an example for each. (2)

F

10129

Reg. No.:_____   Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPTEMBER 2016

Course Code: BE101-05

Course Name: INTRODUCTION TO COMPUTING AND PROBLEM SOLVING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions

1. Von Neumann Architecture uses Stored Program concept. What do you infer from this statement?   (3)

2. Which are the parameters used for rating the performance of a computer?   (3)

3. Draw a flowchart to find given number is odd or even.   (2)

4. List the symbols used in flowchart and describe where each one is used.   (2)

5. Write an algorithm to display even numbers in reverse order starting from 50 to 0.   (2)

6. Give the syntax for if statement in python. Explain how alternative execution and chained conditionals performed in python with examples.   (3)

7. Given,

   a=6

   b=7

   c=42

   Evaluate the following expressions

       Print 1, not a==7 and b==7

       Print 2, not(a==7 and b==6)

       Print 3, not a==7 and b==6   (3)

8. Which of the following is *not* a reason to use a function in your program? Justify your answer.

   a) To break a program into pieces that make sense

   b) To make your program run faster

   c) To produce code that will perform the same action many times but with different values each time

   d) To place repeated code in one place so it can be reused   (2)

9. What is the difference between type conversion and coercion in Python? Give an example for each.   (2)

10. Write a program to calculate *nCr* with a function for finding out factorial.

   [Note: - nCr=n!/r!*(n-r)!] (2)

11. What are the different ways in which we can delete an item from a list? Explain with examples.

   (2)

12. Consider the following code snippet:

   one = "This a test!"

   one[2] = "u"

   print one

   What error will the above code produce? Why is the error caused? Write the Python code which will work around this issue and print the string "Thus a test!" as output. (3)

13. Assume that the variable *data* refers to the dictionary {"b":34,"a":67}. Write the expressions that perform the following tasks

   a) Replace the value at key "b" with negation of the value.

   b) Add key:value pair "c":56 to *data*.

   c) Remove the value at key "a" in *data*. (3)

14. The following code sequence fails with a traceback when user enters a file that does not exist. How would you avoid the traceback and make it so you could print out your own error message when a bad file name was entered?

   fname = raw_input('Enter the file name: ')

   fhand = open(fname)

   Justify your answer. (2)

15. Compare class and object. Generate a class to represent a rectangle. (3)

16. What is pickling? How does it aid in putting values into a file? Also, what happens when the "load" method is invoked? (3)

PART B

Answer any 4 complete questions each having 8 marks

17. a) Describe the memory hierarchy of a computer with the help of a diagram (3)

   b) Write notes on internal memory. (5)

18. Design an algorithm and flowchart to generate 0,1,1,2,3,5,8,13,21,34…..

19. Write a program to generate all prime numbers in a given range.

20. a) Write a python program to find the roots of a quadratic equation. (4)

   b) Define recursion with an example function. (4)

21. a) List the advantages of using functions. (3)

2

b) Write a Python program to calculate the area of a circle, given the centre and a point on the perimeter. Use a function to find radius as the distance between two points. (5)

Answer any 2 complete questions each having 14 marks

22. a) With examples explain the built-in methods used for list operations. (7)

b) Create a dictionary named 'stock'. Add the following elements to stock and perform the following operations.

pencil - 400, pen - 1000, eraser- 200,

ink -50

i. Print stock.

ii. Delete ink and print stock.

iii. Explain keys and key- value pairs find the number of key-value pairs and identify the keys. (7)

23. a) Write a program to replace a substring with a new substring in the given string. (7)

b) Write a program that reads a file and writes out a new file with the lines in reversed order.(7)

24. a) Write a function that gets input from the user and handles the Value Error exception. Describe how exceptions are handled in Python (8)

b) Create a class Student with attributes name and roll no. and a method dataprint() for displaying the same. Create two instances of the class and call the method for each instance. (6)

Reg. No.:_____   Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE101-06

Course Name: INTRODUCTION TO CHEMICAL ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. List the major refineries in India

2. Differentiate molarity, molality and normality

3. If size reduction of large lumps of coal is required, which kind of size reduction equipment will you prefer? Describe its working in few words.

4. Define order and molecularity of a chemical reaction.

5. Distinguish between Block Diagrams and Process Flow Diagrams.

6. Explain the following terms with respect to control systems (a) input, (b) output, (c) feedback, (d) error, (e) open loop& (f) closed loop.

7. Give three examples for novel materials with their applications?

8. Differentiate flash point and fire point.

PART B

Answer 8 questions (At least one question from each Module)

MODULE 1

9. What are the typical tasks of a Chemical Engineer in a process industry?   (5)

MODULE 2

10. Viscosity of water is 1 cP (centi poise). Express it in FPS and SI units.   (5)

MODULE 3

11. What are the various raw materials for soap industry? Describe the manufacture of soap.   (5)

12. Define unit operation? Classify unit operations and explain any one unit operation dealing with solid-liquid separations?   (5)

MODULE 4

13. The rate constants of a certain reaction are 1.6×10^{-3} (sec-1 and 1.625×10^{-2} (sec^{-1}) at 283 K and 303 K respectively. Calculate the activation energy in cal/mol.   (5)

14. Compare and contrast centrifugal and reciprocating pumps?   (5)

MODULE 5

15. A process liquid level needs to be held within 150 ft in a large tank. A pressure transmitter monitors the liquid's level using a pressure reading and sends the result to a controller. The controller opens/closes an inflow/outflow pipe depending on the liquid level. Keeping in mind the given scenario, schematically represent the control system and match the terms: (5)

A	B
A) Inferred process variable	A) 150 ft
B) Manipulated variable	B) Pressure
C) Measured variable	C) Flow of liquid to the tank
D) Set point	D) Level

16. Write the working principle of U-tube manometer. (5)

MODULE 6

17. Explain a typical wastewater treatment facility of a chemical plant. (5)

18. Write any five challenges before the Chemical Engineers in developing environment-friendly products and processes? (5)

PART C

Answer 6 questions (one question from each Module)

MODULE 1

19. Differentiate between continuous and batch processes? List the merits of continuous process over batch process. (6)

20. Explain any one life saving application wherein Chemical engineers have a major role to play with? (6)

MODULE 2

21. Define an ideal gas. What are equations of state? Write any 3 equations of state explaining each term. (6)

22. For fluids in turbulent motion through tubes, the heat transfer coefficient is given by $h = a\left[\frac{C_p \times G^{0.8}}{D^{0.2}}\right]$. The numerical value of the constant a = 10.1, when h is in $B_{tu}/$ (hr ft^2 ^{0}F), C_p is in Btu/ (lb^{0}F), G is in lb/ (ft^2 s) and the D in ft. Determine the value of 'a', when h is measured in W/ (m^2 K); C_p is in kJ/ (kg K); G is in kg/ (m^2 s) and the D in m. (6)

MODULE 3

23. A) Write the step by step procedure for biodiesel production?

   B) Classify different types of polymerization techniques? (6)

MODULE 4

24. Classify heat exchangers. With the help of a neat sketch, explain a double pipe heat exchanger.

(6)

MODULE 5

25. Explain the principle of temperature measurement using thermocouple? (6)

MODULE 6

26. The Bhopal disaster was a gas leak incident in India, considered as the worst ever disaster". What were the circumstances that lead to the disaster? As a chemical engineering student, list the possible safety measures they could have been adopted to prevent the damage? (6)

10133

Reg. No.:_____   Name: _____

D

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2016

Course Code: BE101-06

Course Name: INTRODUCTION TO CHEMICAL ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. Chemical engineer works in various roles. List any three?

2. How much water would I need to add to 500 mL of a 2.4 M KCl solution to make 1M solution?

3. Distinguish between drying and evaporation?

4. "It makes the pan hot when you put it on the stove so that food cooks in it". What mode of heat transfer works here? Write down the equation related to this mode of heat transfer.

5. Process control is a statistics and engineering discipline that deals with architectures, mechanisms and algorithms for controlling the output of a specific process. Specify any three process variables used for control in industries for process.

6. Schematically represent a venturimeter with pressure tapings?

7. List three different techniques for solid waste management in your town?

8. Distinguish BOD, COD and TOC.

PART B

Answer 8 questions (At least one question from each Module)

MODULE 1

9. Write the general definition of a chemical process. Distinguish between the role of chemist and chemical engineer in an industry?   (5)
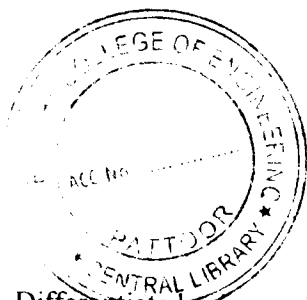
MODULE 2

10. A solution of NaCl in water contains 230 g NaCl per litre at 20 ^{0}C. The density of the solution at this temperature is 1.148 g/cc. Express the composition of the solution in (i) Weight % (ii) Volume % (iii) Molality   (5)

MODULE 3

11. Distinguish unit operations and unit processes with examples.   (5)

12. Explain the principle of distillation. List any two types?   (5)

MODULE 4

13. With neat sketch, classify ideal reactors?   (5)

14. Differentiate laminar and turbulent flow of fluid by explaining Reynold's experiment. (5)

MODULE 5

15. State and explain the principle based on which a thermocouple is working? Enumerate the need for using U-tube manometer and Venturimeter in industries? (5)

16. List the five requirements that are met by implementing a control system for a particular process? (5)

MODULE 6

17. List and explain different waste water treatment techniques? (5)

18. Write down the major causes of Bhopal gas tragedy. (5)

PART C

Answer 6 questions (one question from each Module)

MODULE 1

19. Trace the history of Chemical Engineering starting with the Industrial revolution. What are the modern fields of application of Chemical Engineering? (6)

20. Write the AIChE definition of Chemical Engineering? List the top 10 contributions of chemical engineers to the society. (6)

MODULE 2

21. Explain vapour pressure, partial pressure, concept of ideal gas and equations of state. (6)

22. What are the standard units for length, mass, force, density and energy in SI and FPS systems? The flow rate of water through a pipe is 15 ft^3/min. Express this in kg/s, assuming that water has a density of 1 g/cm^3. (6)

MODULE 3

23. Classify the size reduction equipments and discuss the principles of size reduction involved in each type of equipment. With the help of a neat sketch, explain the operation of a ball mill. (6)

MODULE 4

24. Define 'Black Body.' State the Stefan-Boltzmann Law of radiation indicating the relevant equations and explain each term in the equation. (6)

MODULE 5

25. What are the elements of a Feedback Control loop? Explain with the help of a schematic diagram. (6)

MODULE 6

26. Discuss the physical, chemical and biological characteristics of waste water. (6)

2