

Code No: Z0125/R07

Set No. 1

I B.Tech Supplementary Examinations, November 2009

MATHEMATICS-I

(Common to Civil Engineering, Electrical & Electronic Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Mechatronics, Computer Science & Systems Engineering, Electronics & Telematics, Metallurgy & Material Technology, Electronics & Computer Engineering, Production Engineering, Aeronautical Engineering, Instrumentation & Control Engineering and Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

- (a) Solve $(3y + 2x + 4) dx - (4x + 6y + 5) dy = 0$.

(b) Bacteria in a culture grows exponentially so that the initial number has doubled in three hours. How many times the initial number will be present after 9 hours. [8+8]
- (a) Solve $y'' - 2y' + 2y = x + e^x \cos x$

(b) Find the Particular Integral $(D^2 - 3D + 2) y = 2 e^x \cos \frac{x}{2}$. [8+8]
- (a) Determine whether the hypothesis of Rolle's theorem hold for $f(x) = \begin{cases} \frac{x^3 - 2x^2 - 5x + 6}{x - 1} & \text{if } x \neq 1 \\ -6 & \text{if } x = 1 \end{cases} \quad x \in [-2, 3]$

(b) If $x = \frac{u^2}{v}$, $y = \frac{v^2}{u}$ find $\frac{\partial(u,v)}{\partial(x,y)}$. [8+8]
- (a) Find the radius of curvature of $r = \frac{a}{1 + \cos \theta}$ at (r, θ) .

(b) Trace the curve $y^2 = x^3$. [8+8]
- (a) Find the volume of the solid when ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $(0 < b < a)$ rotates about minor axis.

(b) By transforming into polar coordinates evaluate $\iint \frac{x^2 y^2}{x^2 + y^2} dx dy$ over the annular region between the circles $x^2 + y^2 = a^2$ and $x^2 + y^2 = b^2$, with $b > a$. [8+8]
- (a) Examine the convergence of $1 \cdot \frac{3}{32} + 1 \cdot \frac{3}{32} \cdot \frac{5}{40} + 1 \cdot \frac{3}{32} \cdot \frac{5}{40} \cdot \frac{7}{48} + \dots$

(b) Test the convergence of $\sum [(n + 1)^{1/3} - n^{1/3}] / n$ [8+8]
- (a) Find the work done in moving a particle by the force $\vec{F} = 3x^2 \vec{i} + (2xz - y)\vec{j} + z \vec{k}$ along the line joining $(0,0,0)$ to $(2,1,3)$

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- (b) Using Green's theorem evaluate $\int_C (2xy - x^2) dx + (x^2 + y^2) dy$ where C is the closed curve of the region bounded $y = x^2$ and $y^2 = x$. [8+8]
8. (a) When n is a positive integer, show that $L [t^n] = n! / s^{n+1}$
- (b) Find the Laplace transform of $f(t)$, where $f(t)$ is given by $f(t) = \cos(t - 2\pi/3)$, $t > 2\pi/3$ and $f(t) = 0$ for $t < 2\pi/3$. [8+8]

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Solve $(1 + y^2) + (x - e^{\tan^{-1} x}) \frac{dy}{dx} = 0$.
(b) Show that the system of confocal and coaxial parabolas $y^2 = 4a(x + a)$ is self orthogonal. [8+8]
2. (a) Solve $(D^3 - 3D^2 + 4D - 2) y = e^x$
(b) Solve $(2D^2 + 3D + 2) y = \cosh 2x$. [8+8]
3. (a) Verify Rolle's Theorem for $f(x) = \frac{x^2 - 4x}{x + 2}$ in $[0, 4]$.
(b) Find the points on the sphere $x^2 + y^2 + z^2 = 4$ that are closest and farthest from the point $(3, 1, -1)$. [8+8]
4. (a) Show that the evolute of the curve $x = a(\cos \theta + \theta \sin \theta)$, $y = a(\sin \theta - \theta \cos \theta)$ is a circle.
(b) Find the centre of curvature of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at the point $(a \sec \theta, b \tan \theta)$ [8+8]
5. (a) Evaluate $\iiint \frac{xyz}{\sqrt{x^2 + y^2 + z^2}}$ taken throughout the volume of the sphere $x^2 + y^2 + z^2 = a^2$
(b) Evaluate $\iiint xy \, dx \, dy \, dz$ over the region in the positive quadrant bounded by the line $2x + 3y = 6$. [8+8]
6. (a) Examine the convergence or divergence of $\sum x^{2n-2} / (n+1)n^{1/2}$, $x > 0$.
(b) Examine the convergence or divergence of $\sum \frac{(n!)^2}{(n+1)!} x^n$, $x > 0$. [8+8]
7. (a) If \vec{r} is the position vector of the point (x, y, z) , prove that $\nabla^2(r^n) = n(n+1)r^{n-2}$.
(b) Use Gauss divergence theorem to evaluate $\iiint_S (yz^2\vec{i} + zx^2\vec{j} + 2z^2\vec{k}) \cdot d\vec{S}$, where S is the closed surface bounded by the xy-plane and the upper half of the sphere $x^2 + y^2 + z^2 = a^2$ above this plane. [8+8]

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8. (a) Find $L [(e^{at} - \cos 5t)/t]$.

(b) Find $L [\int_0^t e^{-t} \sin 2t]$.

[8+8]

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Solve $\frac{dz}{dx} + \frac{z}{x} \log z = \frac{z}{x^2} (\log z)^2$
(b) Find the Orthogonal trajectories of the cardioids $r = a(1 - \cos \theta)$ for different values of a. [8+8]
2. (a) Solve $(D^2 + 2D + 2)y = e^{-x} + \sin 2x$
(b) Solve the equation $(D^2 - 2D + 2)y = e^x \tan x$. [8+8]
3. (a) Using Rolle's theorem show that $g(x) = 8x^3 - 6x^2 - 2x + 1$ has a zero between 0 and 1.
(b) If $u = \frac{yz}{x}$, $v = \frac{xz}{y}$, $w = \frac{xy}{z}$ find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$. [8+8]
4. (a) Find the envelope of $y = mx + \sqrt{a^2m^2 + b^2}$ where 'm' is a parameter.
(b) Trace the curve $r = a \sin 3\theta$. [8+8]
5. (a) Evaluate $\int_0^1 \int_0^{1-x} \int_0^{1-x-y} dx dy dz$.
(b) Find the surface area of the solid generated by revolving the arc of the parabola $x^2 = 12y$, bounded by its latus rectum about y-axis. [8+8]
6. (a) Examine the convergence of $\sum \frac{2^2 \cdot 4^2 \cdot 6^2 \dots (2n)^2}{3^2 \cdot 4^2 \cdot 5^2 \dots (2n+2)^2}$
(b) Examine the convergence of $\sum (n^3 - 5n^2 + 7) / (n^5 + 4n^4 - n)$ [8+8]
7. (a) Find the scalar potential ϕ such that $\vec{F} = \nabla\phi$ where $\vec{F} = 2xyz^3 \vec{i} + x^2z^3 \vec{j} + 3x^2yz^2 \vec{k}$
(b) Find the work done by a force $\vec{F} = (x^2 - y^2 + x) \vec{i} - (2xy + y) \vec{j}$ which moves a particle in xy-plane from (0,0) to (1,1) along the parabola $y^2 = x$. [8+8]

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8. (a) Using Laplace transform evaluate $\int_0^{\infty} t e^{-t} \sin t \, dt$.

(b) Using Laplace transform, solve $(D^2 + 4D + 5)y = 5$, given that $y(0) = 0, y''(0) = 0$.

[8+8]

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

- (a) Solve $\frac{dy}{dx} + y = y^2 \log x$.

(b) Find the Orthogonal trajectories of family of curves given by $y = k x^2$, where K is arbitrary. [8+8]
- Solve $(D^2 - 4D + 4) y = e^{2x} + \cos 2x + e^x \sin 2x$. [16]
- (a) Find the region in which $f(x) = \frac{1}{3}\sqrt{9 - x^2}$ is increasing and the region in which it is decreasing using Mean Value Theorem.

(b) Determine whether the functions $u = \frac{x}{y-z}$, $v = \frac{y}{z-x}$, $w = \frac{z}{x-y}$ are dependent. If dependent, find the relationship between them. [8+8]
- (a) Find the radius of curvature of $x = ae^\theta[\sin \theta - \cos \theta]$, $y = ae^\theta[\cos \theta - \sin \theta]$ at $\theta = 0$.

(b) Trace the curve $y^2 (a-x) = x^3$, ($a > 0$) [8+8]
- (a) Find the surface area of the solid obtained by revolving the cycloid $x = a(t + \sin t)$, $y = a(1 + \cos t)$ about its base(x axis)

(b) By changing the order of integration, evaluate $\int_0^4 \int_{\sqrt{y}}^2 e^{\frac{y}{x}} dx dy$. [8+8]
- (a) Examine the convergence of $\sum \sqrt{n} \tan^{-1} (1/n^3)$

(b) Examine the convergence of $\sum [(n + 1) / n^p]$ [8+8]
- Show that $\vec{F} = (e^x z - 2xy) \vec{i} - (x^2 - 1) \vec{j} + (e^x + z) \vec{k}$ is conservative field. Hence evaluate $\int_C \vec{F} \cdot d\vec{r}$ where the end points of C are (0,1,-1) and (2,3,0). [16]

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8. (a) Using Laplace transform evaluate $\int_0^{\infty} t e^{-t} \sin t \, dt$.

(b) Using Laplace transform, solve $(D^2 + 4D + 5)y = 5$, given that $y(0) = 0, y''(0) = 0$.

[8+8]

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

- (a) Test the convergence of the series $\left(\frac{2^2}{1^2} - \frac{2}{1}\right)^{-1} + \left(\frac{3^3}{2^3} - \frac{3}{2}\right)^{-2} + \left(\frac{4^4}{3^4} - \frac{4}{3}\right)^{-3} \dots$ [5]

(b) Show that the series $\frac{\sin x}{1} - \frac{\sin 2x}{2^2} + \frac{\sin 3x}{3^3} + \dots \infty$ converges absolutely. [5]

(c) If $f(x) = \log 2 \sin\left(\frac{\pi x}{2}\right) + \log x$, prove that $\frac{\pi}{2} \log 2 \cos \frac{\pi x}{2} + \frac{1}{x} = 0$ for some $x \in (1,2)$ [6]
- (a) If $x+y+z=u$, $y+z=uv$, $z=uvw$, then evaluate $\frac{\partial(x,y,z)}{\partial(u,v,w)}$

(b) If ρ_1 and ρ_2 are radii of curvatures of any chord of the cardioids $r=a(1+\cos\theta)$ which passes through the pole, then show that $\rho_1^2 + \rho_2^2 = \frac{16a^2}{9}$. [8+8]
- Trace the curve : $y^2(a-x) = x^2(a+x)$. Find the volume of the solid obtained by rotating the loop of this curve about the x- axis. [16]
- (a) Form the differential equation by eliminating the arbitrary constants $y=e^x(\text{acos}x+\text{bsin}x)$.

(b) Solve the differential equation $y(2xy+e^x)dx-e^x dy=0$.

(c) A body kept in air with temperature 25°C cools from 140°C to 80°C in 20minutes. Find when the body cools down to 35°C . [4+6+6]
- (a) Solve the differential equation: $(D^2 + 1)y = e^{-x} + x^3 + e^x \sin x$.

(b) Solve $(D^2 + 4)y = \sec 2x$ by the method of variation of parameters. [8+8]
- (a) Prove that $L\left[\left[\frac{1}{t} f(t)\right]\right] = \int_s^\infty \bar{f}(s) ds$ where $L[f(t)] = \bar{f}(s)$

(b) Find the inverse Laplace Transformation of $\frac{3(s^2-2)^2}{2s^5}$

(c) Evaluate $\int \int (x^2 + y^2) dx dy$ over the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ [5+6+5]

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7. (a) If $\phi_1 = x^2z$, $\phi_2 = xy - 3z^2$, then find $\nabla(\nabla\phi_1 \cdot \nabla\phi_2)$
(b) Evaluate $\int_C \vec{F} \cdot d\vec{r}$ where $F = z i + x j + y k$ and C is $x = a \cos t$, $y = a \sin t$,
 $z = \frac{t}{2\pi}$ from $t = 0$ to $t = 1$. [8+8]
8. Verify divergence theorem for $F = 4xz i - y^2 j + yz k$, where S is the surface of the cube bounded by $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$ and $z = 1$. [16]

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Test the convergence of the following series
 $1 + \frac{3}{1}x + \frac{3.6}{7.10}x^2 + \frac{3.6.9}{7.10.13}x^3 + \dots, x > 0$ [5]
- (b) Test the following series for absolute /conditional convergence
 $\sum \frac{(-1)^n.n}{3n^2-2}$ [5]
- (c) Expand $e^x \sec x$ as a power series in x up to the term containing x^3 [6]
2. (a) If $x = u \cos v, y = u \sin v$ prove that $\frac{\partial(x,y)}{\partial(u,v)} \cdot \frac{\partial(u,v)}{\partial(x,y)} = 1$.
- (b) Find the envelope of the family of ellipses $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ where the two parameters are connected by the relation $a + b = c$ where c is a constant. [8+8]
3. (a) Trace the Folium of Decartes : $x^3 + y^3 = 3axy$.
- (b) Find the surface area generated by rotating the arc of the catenary $y = a \cos(x/a)$ from $x = 0$ to $x = a$ about the x -axis. [8+8]
4. (a) Form the differential equation by eliminating the arbitrary constant 'c':
 $y = 1 + x^2 + c\sqrt{1+x^2}$.
- (b) Solve the differential equation:
 $\frac{dy}{dx} + (y-1) \cos x = e^{-\sin x} \cos^2 x$.
- (c) The temperature of cup of coffee is 92°C , when freshly poured the room temperature being 24°C . In one minute it was cooled to 80°C . How long a period must elapse, before the temperature of the cup becomes 65°C . [3+7+6]
5. (a) Solve the differential equation: $\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = \sin 2x$.
- (b) Solve the differential equation: $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} - 4y = x^4$. [8+8]
6. (a) Evaluate $\int_0^\infty \left(\frac{e^{-t} \sin^2 t}{t} \right) dt$ using Laplace transforms
- (b) Use convolution theorem to evaluate $L^{-1} \left[\frac{s}{(s^2+4)^2} \right]$

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- (c) Evaluate $\int_0^a \int_y^a \frac{x dx dy}{(x^2+y^2)}$ by transforming into polar coordinates [5+6+5]
7. (a) If \mathbf{a} is a constant vector, evaluate $\text{curl}((\mathbf{a}\mathbf{r})/r^3)$ where $\mathbf{r}=\mathbf{x}\mathbf{i}+\mathbf{y}\mathbf{j}+\mathbf{z}\mathbf{k}$ and $r=|\mathbf{r}|$.
(b) Evaluate $\iint_S \mathbf{A}\cdot\mathbf{n} ds$ for $\mathbf{A}=(x+y^2)\mathbf{i} - 2x\mathbf{j} + 2yz\mathbf{k}$ and S is the surface of the plane $2x+y+2z=6$ in the first octant. [8+8]
8. (a) Apply Green's theorem to evaluate $\oint_C (2xy - x^2)dx + (x^2 + y^2)dy$,
where "C" is bounded by $y = x^2$ and $y^2 = x$.
(b) Apply Stoke's theorem to evaluate $\int_C (y dx + z dy + x dz)$
where 'C' is the curve of the intersection of the sphere $x^2 + y^2 + z^2 = a^2$ and $x + z = a$. [8+8]

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Test the convergence of the following series $\sum \frac{(2n+1)}{n^3+1} x^n$, $x > 0$. [5]
(b) Test the following series for absolute /conditional convergence
$$\sum_{n=1}^{\infty} (-1)^n \frac{\log n}{n^2}$$
 [5]
(c) Verify cauchy's mean value theorem for $f(x) = e^x$ and $g(x) = e^{-x}$ in $[a,b]$ [6]
2. (a) If $u=x^2-y^2$, $v=2xy$ where $x=r \cos\theta$, $y=r\sin\theta$ show that $\frac{\partial(u,v)}{\partial(r,\theta)} = 4r^3$.
(b) For the cardioid $r=a(1+\cos\theta)$ prove that $\frac{\rho^2}{r}$ is constant, where ρ is the radius of curvature. [8+8]
3. (a) Trace the curve $y^2 = \frac{x^2(a-x)}{a+x}$.
(b) The part of the parabola $y^2 = 4ax$ cut off by the latus-return revolves about the tangent at the vertex. Find the surface area of revolution. [8+8]
4. (a) Form the differential equation of the family of curves $\log (y+a) = x^2+c$, c is the parameter.
(b) Solve the differential equation: $3\frac{dy}{dx} - y \cos x = y^4(\sin 2x - \cos x)$.
(c) An object whose temperature is 75°C cools in an atmosphere of constant temperature 25°C at the rate $k\theta$, θ being the excess temperature of the body over the atmosphere. If after 10 minutes the temperature of the objects falls to 65°C . Find its temperature after 20 minutes. Find the time required to cool down to 55°C . [3+7+6]
5. (a) Solve the differential equation: $(D^3 + 1)y = \cos(2x - 1)$.
(b) Solve the differential equation: $(D^2 + 1)y = \cos x$ by the method of variation of parameters. [8+8]
6. (a) Find the Laplace Transformation of the following function: $t e^{-t} \sin 2t$.

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- (b) Using Laplace transform, solve $y'' + 2y' + 5y = e^{-t} \sin t$, given that $y(0) = 0, y'(0) = 1$.
- (c) Evaluate $\int_0^5 \int_0^{x^2} x(x^2 + y^2) dx dy$ [5+6+5]
7. (a) Show that $\vec{F} = (z^2 + 2x + 3y) i + (3x + 2y + z) j + (y + 2zx) k$ is irrotational. Hence find the corresponding scalar potential ϕ such that $\vec{F} = \nabla \phi$.
- (b) Evaluate $\iint_S \vec{F} \cdot ds$ where $\vec{F} = xy i - x^2 j + (x + z) k$ and S is the region of the plane $2x + 3y + z = 6$ bounded in the first octant. [8+8]
8. Verify divergence theorem for $\mathbf{F} = 2xz\mathbf{i} + yz\mathbf{j} + z^2\mathbf{k}$ over upper half of the sphere $x^2 + y^2 + z^2 = a^2$. [16]

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Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

- Test the convergence of the series $\left(\frac{2^2}{1^2} - \frac{2}{1}\right)^{-1} + \left(\frac{3^3}{2^3} - \frac{3}{2}\right)^{-2} + \left(\frac{4^4}{3^4} - \frac{4}{3}\right)^{-3} \dots$ [5]
 - Show that the series $\frac{\sin x}{1} - \frac{\sin 2x}{2^2} + \frac{\sin 3x}{3^3} + \dots \infty$ converges absolutely. [5]
 - If $f(x) = \log 2 \sin\left(\frac{\pi x}{2}\right) + \log x$, prove that $\frac{\pi}{2} \log 2 \cos \frac{\pi x}{2} + \frac{1}{x} = 0$ for some $x \in (1,2)$ [6]
- Find the stationary points of the following function 'u' and find the maximum or the minimum value
 $u = x^2 + 2xy + 2y^2 + 2x + y$
 - Find the envelope of the family of circles $x^2 + y^2 - 2ax \cos\theta - 2ay \sin\theta = c^2$ (θ is a parameter) [8+8]
- Trace the Cissoid of Diocles : $y^2 (2a-x) = x^3$.
 - Show that the surface area of the spherical zone contained between two parallel planes of distance 'h' units apart is $2\pi ah$, where 'a' is the radius of the sphere. [8+8]
- Form the differential equation by eliminating the arbitrary constant $\sec y + \sec x = c + x^2/2$.
 - Solve the differential equation:
 $(2y \sin x + \cos y) dx = (x \sin y + 2 \cos x + \tan y) dy$.
 - Find the orthogonal trajectories of the family: $r^n \sin n\theta = b^n$. [3+7+6]
- Solve the differential equation $(D^2+4)y=e^x+\sin 2x$.
 - Solve the differential equation $(x^2 D^2 - x D + 1)y = \log x$. [8+8]
- Prove that $L \left[\int_t^\infty f(t) dt \right] = \int_s^\infty \bar{f}(s) ds$ where $L [f(t)] = \bar{f}(s)$

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- (b) Find the inverse Laplace Transformation of $\frac{3(s^2-2)^2}{2s^5}$
- (c) Evaluate $\int \int (x^2 + y^2) dx dy$ over the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
[5+6+5]
7. (a) Prove that $\vec{F}=(2x+yz)\mathbf{i} + (4y+zx)\mathbf{j} - (6z-xy)\mathbf{k}$ is solenoidal as well as irrotational. Also find the scalar potential of \vec{F}
- (b) Evaluate $\int_C \vec{F} dt$ where $\vec{F}=(x-y)\mathbf{i}+(y-2x)\mathbf{j}$ and C is the closed curve in the xy plane $x=2\cos t, y=3\sin t$ from $t=0$ to 2π [8+8]
8. Verify divergence theorem for $\mathbf{F} = x^3 \mathbf{i} + y^3 \mathbf{j} + z^3 \mathbf{k}$ taken over the surface of the sphere $x^2+y^2+z^2= a^2$. [16]

Code No: Y2301/R05

Set No. 1

I B.Tech Supplementary Examinations, November 2009
COMPUTER PROGRAMMING FOR BIOTECHNOLOGISTS
(Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Draw the block diagram of an 8-bit, 8-word RAM system and explain briefly its operations.
(b) Compare serial and parallel memory with respect to the speed of reading and writing. [10+6]
2. (a) Define the terms:
 - i. Throughput
 - ii. Turnaround time
 - iii. Swapping.(b) What are the main features of MS-DOS and UNIX operating system? [6+10]
3. (a) Draw a Flowchart for the following
The average score for 3 tests has to be greater than 80 for a candidate to qualify for the interview. Representing the conditional logic for generating reject letters for all candidates who do not get the required average and interview call letters for the others.
(b) Explain the basic structure of C program. [6+10]
4. (a) In what way array is different from an ordinary variable?
(b) What conditions must be satisfied by the entire elements of any given array?
(c) What are subscripts? How are they written? What restrictions apply to the values that can be assigned to subscripts?
(d) What advantage is there in defining an array size in terms of a symbolic constant rather than a fixed integer quantity?
(e) Write a program to find the largest element in an array. [2+2+4+4+4]
5. What do you mean by functions? Give the structure of the functions and explain about the arguments and their return values. [16]
6. (a) Explain the different ways of passing structure as arguments in functions.
(b) Write a C program to illustrate the method of sending an entire structure as a parameter to a function. [6+10]
7. Declare two queues of varying length in a single array. Write functions to insert and delete elements from these queues. [16]
8. Write a bioperl program that takes a set of (related sequences) in FASTA format.

Code No: Y2301/R05

Set No. 1

- (a) aligns them using ClustalW
- (b) converts them to PHYLIP format.

[8+8]

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Code No: Y2301/R05

Set No. 2

I B.Tech Supplementary Examinations, November 2009
COMPUTER PROGRAMMING FOR BIOTECHNOLOGISTS
(Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. With a neat diagram explain the working of an execution unit of a CPU. [16]
2. (a) What are time sharing systems? Explain time sharing using timing diagram.
(b) What is batch operating system? Explain batch mode of operation using timing diagrams. [8+8]
3. (a) What is the purpose of the if-else statement? In what way is this statement different from the while, the do-while and the for statements.
(b) A cloth showroom has announced the following seasonal discounts on purchase of items:

Purchase amount	Discount	
	Mill items	Handloom items
0-100	-	5%
101-200	5%	7.5%
201-300	7.5%	10.0%
above 300	10.0%	15.0%

Write a C program to read purchase extent and calculate discount. Also print the purchase amount and discount. [6+10]

4. (a) Write a program to sort the set of strings in an alphabetical order?
(b) How are multidimensional arrays defined? Compare with the manner in which one-dimensional arrays are defined. [12+4]
5. Write a C program that uses a function to sort an array of integers. [16]
6. (a) What is a structure? How is it declared? How it is initialized?
(b) Define a structure to represent a data. Use your structures that accept two different dates in the format mmdd of the same year. And do the following:
Write a C program to display the month names of both dates. [6+10]
7. Write in detail about the following:
 - (a) Recursion
 - (b) Applications of Queues [8+8]
8. Write a bioperl script to identify restriction enzyme sites for a given sequence.[16]

Code No: Y2301/R05

Set No. 3

I B.Tech Supplementary Examinations, November 2009
COMPUTER PROGRAMMING FOR BIOTECHNOLOGISTS
(Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are the types of voice recognition system? What does "training" such a system, mean?
(b) What are transducers? Name any five physical properties that are commonly measured by transducers. [8+8]
2. (a) Distinguish between Windows 95 and Windows NT.
(b) Explain the important features of PC operating systems. [6+10]
3. (a) Describe the two different forms of the if-else statement. How do they differ?
(b) Compare the use of the if-else statement with use of the ?: operator. In particular, in what way can the ?: operator be used in place of an if-else statement?
(c) Admission to a professional course is subject to the following conditions:
 - i. marks in maths ≥ 60 .
 - ii. marks in physics ≥ 50 .
 - iii. marks in chemistry ≥ 40 .
 - iv. total in all three subjects ≥ 200 .Given the marks in three subjects, write a C program to process the application to find whether eligible or not. [6+4+6]
4. (a) Write a C program to do Matrix Multiplications.
(b) Write in detail about one dimensional and multidimensional arrays. Also write about how initial values can be specified for each type of arrays? [10+6]
5. What do you mean by functions? Give the structure of the functions and explain about the arguments and their return values. [16]
6. (a) What is a structure? How is it declared? How it is initialized?
(b) Define a structure to represent a data. Use your structures that accept two different dates in the format mmdd of the same year. And do the following: Write a C program to display the month names of both dates. [6+10]
7. Write a program to convert a postfix expression to a fully parenthesized infix expression. For example, AB+ would be transformed in to (A+B) and AB+C- would be transformed into ((A+B)-C). [16]

Code No: Y2301/R05

Set No. 3

8. Write a bioperl script that runs clustalw on a given protein FASTA file (use the any protein file as example). [16]

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Set No. 4

I B.Tech Supplementary Examinations, November 2009
COMPUTER PROGRAMMING FOR BIOTECHNOLOGISTS
(Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. With a neat diagram explain the working of an execution unit of a CPU. [16]
2. Give a neat sketch showing major components of Unix OS and explain functions of each of them. [16]
3. (a) C program contains the following declarations and initial assignments.
int i=8, j=5, k;
float x=0.005, y = - 0.01, z;
char a,b,c='d',d='c';
Determine the value of each of the following assignment expressions.
 - i. $i -= (j > 0) ? j : 0$; y
 - ii. $a = (y >= 0) ? y : 0$
 - iii. $i += (j - 2)$;
 - iv. $z = (j == 5) ? i : j$(b) What are the increment and decrement operators? Explain with proper example with differentiates prefix and postfix operations. [4+6+6]
4. (a) Write a C program to do Matrix Multiplications.
(b) Write in detail about one dimensional and multidimensional arrays. Also write about how initial values can be specified for each type of arrays? [10+6]
5. Write a C program that uses a function to sort an array of integers. [16]
6. (a) What is a structure? How is it declared? How it is initialized?
(b) Define a structure to represent a data. Use your structures that accept two different dates in the format mmdd of the same year. And do the following:
Write a C program to display the month names of both dates. [6+10]
7. Declare two queues of varying length in a single array. Write functions to insert and delete elements from these queues. [16]
8. Write a bioperl program that takes a sequence and finds homologs from SwissProt using *remote_blast*. [16]

Code No: A9905/RR

RR

I B.Tech Supplementary Examinations, November 2009

ENGINEERING GRAPHICS

(Common to Civil Engineering, Mechanical Engineering, Mechatronics,
Metallurgy & Material Technology, Production Engineering, Aeronautical
Engineering and Automobile Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Draw a Diagonal scale of R.F 3:100, showing meters, decimeters and centimeters and to measure up to 5 meters. Show the length of 3.69 meters on it. [16M]
2. A circle of 60 mm diameter rolls on a horizontal line for half a revolution clock - wise and then on a line inclined at 60 degrees to the horizontal for another half, clock - wise. Draw the curve traced by a point P on the circumference the circle, taking the top most point on the rolling circle as generating point in the initial position. [16M]
3. The front view of a line AB measures 65 mm and makes an angle of 45 degrees with xy . A is in the H.P. and the V.T. of the line is 15 mm below the H.P. The line is inclined at 30 degrees to the V.P. Draw the projections of AB and find its true length and inclination with the H.P. Also locate its H.T. [16M]
4. A cone of base diameter 60 mm and altitude 75mm lies on the HP on one of its generators. The plan of the axis is inclined at 45° to the VP. Draw its projections. [16M]
5. A cone of base diameter 50 mm and axis length 70 mm rests with its base on HP. A section plane perpendicular to V.P and inclined at 35° to HP bisects the axis of the cone. Draw the development of the truncated cone. [16]
6. Draw the isometric projection of a Frustum of hexagonal pyramid, side of base 30 mm the side of top face 15mm of height 50 mm. [16]
7. Convert the orthogonal projections shown in figure1 below into an isometric view of the actual picture. [16M]

Code No: A9905/RR

RR

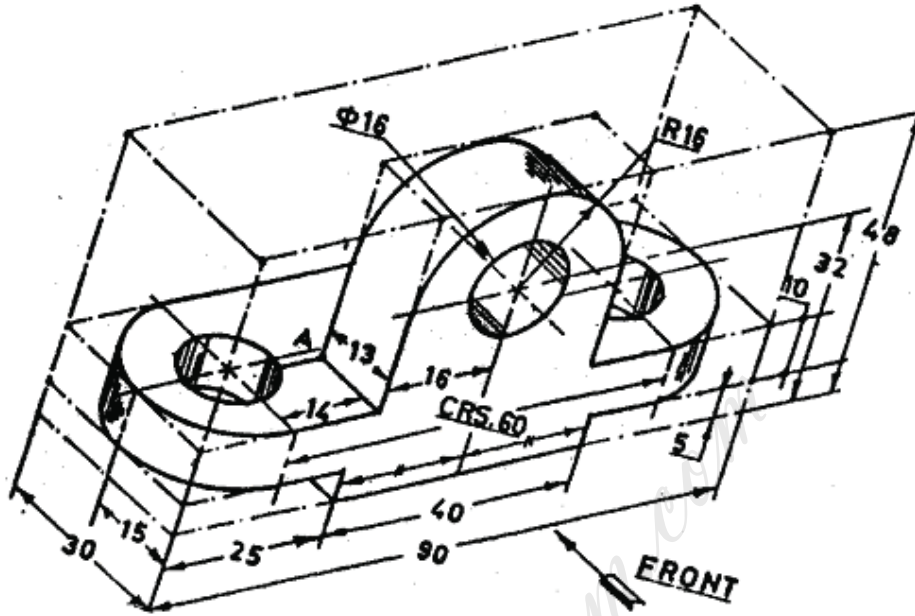


Figure 1:

8. Draw the perspective view of a right regular hexagonal prism, edge of base 25 mm and 60 mm long lying on ground on one of its rectangular faces such that its axis is inclined at 30° to the picture plane and one of its vertical edges touching the picture plane. The station point is 80 mm in front of the picture plane, and lies in a central plane bisecting the axis. The horizon is in the level of the rectangular faces of the prism. [16M]

Code No: A9910/RR

RR

I B.Tech Supplementary Examinations, November 2009

ELECTRONIC DEVICES AND CIRCUITS

(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering and Instrumentation & Control Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Derive the expression for the electro static deflection sensitivity in the case of CRT.
(b) Compare electro static and electro-magnetic deflection sensitivity in all respects. [8+8]
2. (a) Explain the following terms
i. Storage time
ii. Transitive time
iii. junction capacitance.
(b) Calculate the dynamic forward and reverse resistance of a p-n junction diode when the applied voltage is 0.25V at T=300K Given $I_o = 2\mu A$. [8+8]
3. (a) What is a rectifier? Show that a PN diode acts as a rectifier.
(b) Draw the circuit diagram for a half wave rectifier and explain its operation.
(c) Explain the various types of filters used in power supplies. [4+6+4]
4. (a) Explain the mechanism of current flow in a PNP and NPN Transistor
(b) In a transistor operating in active region, although the collector Junction is reverse - biased, the collector current is quite large Explain. [10+6]
5. (a) What is load line?. Discuss how the load line can be drawn on the Ic-Vce characteristics for a bipolar transistor amplifier.
(b) What is β of a transistor?.
(c) Draw a graph showing the variation of α with emitter current in a BJT. [8+4+4]
6. (a) Draw the circuit diagram of CE amplifier with emitter resistance and obtain its equivalent hybrid model and derive expressions for A_I , R_1 , A_V use approximate analysis.
(b) Determine A_v , A_I , R_i , R_o for CE amplifier using n-p-n transistor with $h_{ie} = 1200\Omega$ $h_{re} = 0$ $h_{fe} = 36$ $h_{oe} = 2 \times 10^{-6} mho$ $R_L = 2.5k\Omega$ $R_S = 500\Omega$ (neglect the effect of biasing circuit) [8+8]

Code No: A9910/RR

RR

7. (a) Explain the concept of feedback as applied to electronic amplifier circuits. What are the advantages and disadvantages of positive and negative feedback?
(b) With the help of general block diagram explain the term feedback.
(c) Define the following terms in connection with feedback. [6+4+6]
- Return difference feedback.
 - Closed loop voltage gain.
 - Open loop voltage gain.
8. (a) Derive an expression for frequency of oscillation of transistorized Colpitts oscillator.
(b) A quartz crystal has the following constants. $L=50\text{mH}$, $C_1=0.02\text{PF}$, $R=500\Omega$ and $C_2=12\text{PF}$. Find the values of series and parallel resonant frequencies. If the external capacitance across the crystal changes from 5PF to 6PF, find the change in frequency of oscillations. [8+8]

Code No: A0803/RR

RR

I B.Tech Supplementary Examinations, November 2009
INTRODUCTION TO CHEMICAL ENGINEERING
(Chemical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the water softening process lime soda process.
(b) Explain the Farady's laws qualitatively and quauitatively. [8+8]
2. (a) Explain a combined detailed flow diagram of a process.
(b) State the different forms of energy associated with mass.
(c) Write the general energy balance equation for a flow system. [4+4+8]
3. Explain how pressure drops can be calculated for isothermal viscous flow? [16]
4. Write about the different methods of feeding with figures? [16]
5. (a) Write the relation between individual and overall mass transfer coefficients and also mention units of each.
(b) Briefly explain design of packed adsorption column. [6+10]
6. (a) With a neat sketch briefly explain the construction and working principle of Bubble - Cap plate column.
(b) Give some industrially important packing materials used in packed column. [12+4]
7. (a) Explain the term distribution coefficient with respect to liquid-liquid extraction, for both dilute solutions and concentrated solutions.
(b) Describe the multistage extraction process for separation of a liquid mixture consisting of two components A and B. [6+10]
8. Discuss in detail about the various types of adsorption equipment. [16]
