F.Y.B.Sc (Computer Science)

Foundation Course - (I)

August 2018

WA-JP-Exam.-1st Half-2018-86

Con. 332–18. **DK-6101**

(3 Hours) **[Total Marks : 100**

N.B. : (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

1. What do you understand by 'Violence against Women' (VAW) ? Disucss various forms of violence against women and state the suitable measures to curb them. **15**

OR

Write short notes on **each** of the following :–
(a) multi-religionism
(b) characteristics and problems of urban area
(c) casuses of declining of sex ratio.

2. What are the salient features of the Indian Constitution ? Explain each in brief. **15**

OR

Write short notes on **each** of the following :–
(a) Fundamental duties of Indian citizen.
(b) Regionalism in India.
(c) Structure of the Indian Constitution.

3. Discuss the role and significance of the women in Indian Politics. **20**

OR

Write short notes on **each** of the following :–
(a) Problems of elderly persons
(b) Prevention of HIV/AIDS.

4. Define the concept of 'globalization'. Bring out its impact on various sectors. **15**

OR

Write short notes on **each** of the following :–
(a) Universal declaration of human rights
(b) Right of liberty
(c) Right of constitutional remedies.

5. What do you understand by ecosystem ? State the structure and functions of ecosystem. **15**

OR

Write short notes on **each** of the following :–
(a) Agents of socialization
(b) Sustainable developmental degradation.

6. Explain in detail Maslow's theory of actualization. **20**

OR

Write short notes on **each** of the following :–
(a) Crimes among Indian youth
(b) Farmer's suicide in India.

[TURN OVER

(3 Hours) [Total Marks : 80

N.B. : (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

1. Answer any **four** of the following :– 16
   (a) Multilingualism.
   (b) Forms of violence against women.
   (c) Eighth schedule of Inidan Consitution.
   (d) Causes of declining sex ratio.
   (e) Characteristics and problems of tribal area.
   (f) Types of disabilities.

2. Answer any **four** of the following :– 16
   (a) Communalism in India.
   (b) Lingulism in India.
   (c) Regionalism in India.
   (d) Fundamental duties of Indian citizen.
   (e) Caste system in India.
   (f) Structure of the Indian Constitution.

3. Answer any **four** of the following :– 16
   (a) Party system of India.
   (b) Local self government.
   (c) Causes of HIV/AIDS.
   (d) Impact of globlisation on IT sector.
   (e) Philosophy of Human Right.
   (f) Right to liberty.

4. Answer any **four** of the following :– 16
   (a) Concept of Ecosystems
   (b) Sustainable development.
   (c) Causes of socialization
   (d) Agents of socialization.
   (e) Role of ethics in human life.
   (f) Techniques of prevention of aggression.

5. Answer any **four** of the following :– 16
   (a) Conflict management mechanism.
   (b) Features of self actulization theory.
   (c) Efforts to build harmony in society.
   (d) Agrarian distress.
   (e) Suicides among youth.
   (f) Genetically modified crops.

F.Y.B.Sc (Computer Science)

Aug 2018

P4-Exam.-2018-1-12
Con. 340–18.

Mathematics - (Paper - I)

DK–6281

(3 Hours) [Total Marks : 80

N.B. (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

Q.1 Attempt any **four** of the following : **16**

(a) Let $f:[a,b]\to[a,b]$ be a continuous function then show that there exist $c\in[a,b]$ such that $f(c)=c$.

(b) Check the continuity of f(x) at x = 0 where $f(x)=2x-3$ if $x\le 0$
$=x+1$ if $x>0$

(c) Find tangent and normals to the curve $x^2+xy-2y^2=12$ at the point (2,3)

(d) Calculate third order derivative of $\sin^3(x)$.

(e) Verify CMVT for the function f(x) = sinx and g(x) = cosx on $\left[0,\frac{\pi}{2}\right]$.

(f) Find Taylor's polynomial of degree 4 generated by f(x) = cosx at x = 0.

Q.2 Attempt any **four** of the following :– **16**

(a) Show that $|a+b|\le|a|+|b|$ where a and b are real number.

(b) Using definition evaluate $\lim_{x\to\sqrt{3}} x^4=9$.

(c) Use definition to find derivative of $f(x)=8-x^2$.

(d) Show that every differential function are continuous.

(e) Find asymptotes of $y=\frac{2x^2-x-14}{x-3}$.

(f) Find extreme value of function $f(x)=x^4-18x^2+4$.

Q.3 Attempt any **four** of the following :– **16**

(a) State sandwich theorem and hence evaluate $\lim_{(x,y)\to(0,0)} \frac{x^3}{x^2+y^2}$.

(b) Define the level curves of the function of two variables and plot the level curves of $f:\Re^2\to\Re$ is given by $f(x,y)=4-x^2-y^2$.

(c) Find a vector which is perpendicular to the plane containing the points A(–1, –1,0), B(2, 2, –1) and C(–3, 1, 2).

(d) Write the spherical co-ordinates of the point (1,2,1).

(e) Find $\frac{\partial f}{\partial x}$ if $f(x,y)=\frac{x^2y}{\sqrt{x^2+y^2}}$.

(f) Find the minimum value of $x^2+y^2+z^2$ when $x+y+z=3a$.

[TURN OVER

Q.4 Attempt any **four** of the following : **16**

(a) Find the area of parallelogram formed by $\overline{AB}$ and $\overline{AC}$ if A = (2, 1, 2) B = (3, 2, 1) and C = (5, 5, 1).

(b) Find the point in which the line x = –1, y = 3t, z = t intersect the plane having equation x – y + 3z = 6.

(c) Discuss the continuity of $f(x, y, z) = 3x - y^2 + e^z$ at (1, 1, 0).

(d) Using two path test check whether $\lim_{(x,y)\to(0,0)} \left[\frac{x^3 - y^3x}{x^2 + y^2}\right]$ exist or not.

(e) Find the linerization of $f(x,y) = x^2 - xy + \frac{y^2}{2} + 3$ at a point (3, 2).

(f) If $z = \cos\left(x^2y^2\right)$ then find $\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2$.

Q.5 Attempt any **four** of the following : **16**

(a) Define floor function and draw its graph.

(b) If $y = \frac{\log x}{x}$ then prove that $x^3y_2 = 2xy - 3$.

(c) State and prove Rolle's mean value theorem of differentiability.

(d) Find equation of plane passing through the point (1,2,3) and having the normal vector $\hat{i} - 2\hat{j} + \hat{k}$.

(e) Using polar co-ordinate evaluate $\lim_{(x,y)\to(0,0)} \frac{x^3}{x^2 + y^2}$.

(f) If $u = \log\left(x^2 + y^2\right)$ then show that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$.

Con. 340–18. **DK–6281**

(3 Hours) **[Total Marks : 100**

N.B. (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

Q.1 Attempt any **one** of the following :

(a) State and prove Rolle's Theorem of differentiability and verify it for function $f(x) = e^{-x} \sin x \ [0 \ \pi]$ **10**

(b) Show that differentiable function is continuous. Is the converse true ? Justify. Check the differentiability of function at x = 0 where **10**

$$f(x) = x\cos\left(\frac{1}{x}\right) \quad x = 0$$
$$= 0 \qquad\qquad x = 0$$

Q.2 Attempt any **three** of the following :

(a) Define Absolute function and draw its graph. **5**

(b) Define a limit of the function at a point and use it to prove that $\lim_{x\to 4}\sqrt{x+2} = \sqrt{6}$ **5**

(c) Discuss the continuity of the function in the domain [0, 3]. **5**

$$f(x) = \frac{\sqrt{x^2+5}-3}{x-2} \quad \text{at } x \neq 2$$
$$= 1 \qquad\qquad \text{at } x = 2$$

(d) Define the following (i) Removable discontinuity (ii) non removable discontinuity. Give two example of each. **5**

Q.3 Attempt any **three** of the following :

(a) Use definition to find derivative of f(x) = logx. **5**

(b) Find the tangent and normal to the curve $x^2 + xy - y^2 = 1$ at a point (2, 3). **5**

(c) Calculate n^{th} order derivative of $y = (ax + b)^m$ $m \in N$. **5**

(d) Find $\frac{d^2y}{dx^2}$ for the function $y = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$. **5**

Q.4 Attempt any **three** of the following :

(a) Verify CMVT for the function $f(x) = e^x$; $g(x) = \frac{x^2}{x^2+1}$ on $[-1, 1]$. **5**

(b) Find Taylor's polynomial of degree n generated by $f(x) = e^x$ at x = 0. **5**

(c) Find extreme value of function $f(x) = x^4 - 18x^2 + 4$. **5**

(d) Sketch the graph using derivatives function f if $f(x) = x^2 + x + 3$. **5**

[TURN OVER

Q.5 Attempt any **three** of the following :–

(a) If a line makes directed angle α, β, γ with axes, then prove that **5**

(i) $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$ (ii) $\cos2\alpha + \cos2\beta + \cos2\gamma = 2$.

(b) Find the volume of the parallelepiped whose edges are represented by the vectors **5**

$\bar{a} = 2\hat{i} - 3\hat{i} + 4\hat{k}, \bar{b} = \hat{i} + 2\hat{j} - \hat{k}$

(c) Express the equation $x^2 + y^2 - 4x - 6y + 4 = 0$ in polar form. **5**

(d) Find the equation of plane through the point (2, 1, 0) and $2x - y - z = 5, x + 2y - 3z = 5$. **5**

Q.6 Attempt any **three** of the following :–

(a) State Sandwich theorem and find $\lim_{(x,y)\to(0,0)} \frac{x^3}{x^2+y^2}$. **5**

(b) Define the level curves of the function of two variables and plot the level curve of **5**

$f : \Re^2 \to \Re$ is given by $f(x, y) = 2x + 4y$ and $c = 0, 1$.

(c) Evaluate the limit by using polar co-ordinates. **5**

(i) $\lim_{(x,y)\to(0,0)} \cos\left[\frac{x^3 - y^3}{x^2 - y^2}\right]$ (ii) $\lim_{(x,y)\to(0,0)} \cos\left[\frac{x^2 - y^2}{x^2 + y^2}\right]$

(d) Using two path test check whether following limit exist. **5**

(i) $\lim_{(x,y)\to(0,0)} \cos\left[\frac{x^3 - y^2x}{x^2 + y^2}\right]$ (ii) $\lim_{(x,y)\to(0,0)} \cos\left[\frac{2(x^2 - y^2)}{5(x^2 + y^2)}\right]$

Q.7 Attempt any **three** of the following :

(a) Find the minimum value of $x^2 + y^2 + z^2$ when $x + y + z = 3a$. **5**

(b) Find all second order partial derivatives $f(x,y) = x \cos y + ye^x$. **5**

(c) Defined gradient vector. Find derivative of f $f(x,y) = \log(x^2 + y^2)$ at point P(1, 1) in the **5**

direction of unit vector $\bar{u} = 2\hat{i} - 3\hat{j}$.

(d) Find the linerization of $f(x, y) = y\cos x - x\sin y$ at a point. **5**

F.Y.B.Sc (Computer Science)

Mathematics - (Paper - II)

Aug 2018

Con. 341–18. DK-6693

(3 Hours) [Total Marks : 100

1. ALL QUESTIONS ARE COMPULSORY
2. FIGURES TO THE RIGHT INDICATE FULL MARKS TO THE SUBQUESTIONS
3. FROM QUESTION 2 TO 7, SUBQUESTION (a) IS COMPULSORY AND ATTEMPT ANY TWO FROM (b)(c)&(d)

Q.1 Attempt any one:

(a)State and prove Division Algorithm for integers. (10)

(b) Prove that number of permutations on n-symbols is $n!$ and write down all permutations on 3 symbols. (10)

Q.2 (a) For a, b ∈ N, Prove that gcd(a,b)*lcm(a,b)=a*b. [*=multiplication] (7)

(b)State Pascal's rule and write Pascal's Triangle for n=4. (4)

(c) find lcm and gcd of 150 and 230. (4)

(d) Prove that if a/b & b/c then a/c. (4)

Q.3 (a) find the number of Surjective functions from n-set to 2-set. (7)

(b)Show that the mapping f(x)=x+5 from Real numbers to itself is Bijective & find its inverse. (4)

(c) Prove that for any two sets A & B, A⊆B iff A∩B=A. (4)

(d) Check whether the Operation a*b=$a^2 + b^2$ Associative & Commutative on N. (4)

[TURN OVER

Q.4 (a)If a,b,c,d are integers & n is fixed positive integer then if $a \equiv b \pmod n$ & $b \equiv c \pmod n$ then $a \equiv c \pmod n$ (7)

(b) Show that 89 divides $2^{44}-1$. (4)

(c) Solve the Equation $17x \equiv 9 \pmod{276}$ (4)

(d) Find last digit of 11^{16} (4)

Q.5 (a)In Z, R defined by xRy iff x-y is divisible by 5.Prove that R is an equivalence relation and find the Corresponding Equivalence Classes. (7)

(b)How many different letters words can be formed by using the letters of "MATHS". (4)

(c)In how ways can 12 different books be distributed among four children so that (4)

(i)each child gets 3 books

(ii)the two oldest children get four books each while two youngest get two books each

(d) Write all derangements on S= {1, 2, 3}. (4)

Q.6 (a)find the number of positive integers between 1 to 200 which are not divisible by 2,3 or 7. (7)

(b)find the total number of integer solutions to $x + y + z = 45$ (4)

(c)Define irreflexive , Asymmetric and equivalence relation. (4)

(d)Compute S(4,2). (4)

Q.7 (a)State and Prove Rational Roots theorem. (7)

(b) Find all solutions of $x^3-i=0$. (4)

(c)find gcd of $f(x)=x^4-x^2+x-1$ and $g(x)=x^3-x^2+x-1$ in Q[x] (4)

(d)find all cube roots of $1+i$. (4)

****

8

(3 Hours) [Total Marks : 80

N.B. : (1) All Questions are Compulsory.

(2) Each question carries 16 marks.

(3) Internal choices are there in each question.

(4) Figures to the Right indicate Full marks.

Q.1 Attempt any **four** questions from the following. 16

(a) Find LCM and GCD of 1705 and 625.

(b) Prove that number of permutation on n symbols is n!

(c) For a, b N, Prove that if a/b & b/a then a=b.

(d) For a, b N, If GCD(a, b)=1 Prove that GCD(a+b, a-b)=1 or 2

(e) State Pascal's rule and write Pascal's Triangle for n=4.

(f) Prove that if a/b then 3^a-1/3^b-1.

Q.2 Attempt any **four** questions from the following. 16

(a)Check whether the Operation a*b=a+b-7 is Associative & Commutative on Z.

(b) Prove that for any three sets A,B & C ,(AUB)∩C=(A∩C)U(B∩C).

(c) Show that the mapping f(x)=7x+5 from Real numbers to itself is Bijective & find its inverse.

(d) Prove that Inverse of Bijective map is also Bijective.

(e) A & B are two finite sets. If A B & f from A to B is a surjective map then Prove that A=B.

(f)Define injective and surjective function with examples.

Q.3 Attempt any **four** questions from the following. 16

(a) If a,b,c,d are integers & n is fixed positive integer then if $a \equiv b \pmod n$ & $c \equiv d \pmod n$ then $a-c \equiv b-d \pmod n$.

(b) Find last digit of 13^{516}

(c) Solve the Equation $17x \equiv 9 \pmod{276}$

(d) Show that 41 divides $2^{20}-1$.

(e) Prove that $10! \equiv -1 \pmod{11}$

(f) state and prove wilson's theorem.

Q.4 Attempt any **four** questions from the following. 16

(a) In Z, R defined by xRy iff x-y is divisible by 3.Prove that R is an equivalence relation.

(b) Write all derangements on S= {a , b, c} .

(c) How many different letters words can be formed by using the letters of "MISSISSIPPII".

(d)find the total number of integer solutions to $x_1+x_2+x_{34}=25$.

(e)Find the number of positive integers between 1 to 100 which are not divisible by 3 or 5.

(f) write the following permutation as product of transpositions

Q.5 Attempt any **four** questions from the following. 16

(a) find all cube roots of 1.

(b)Using De Moivre's Theorem, find x^{10} if $x=1+i$

(c)Find gcd of $f(x)=x^4-x^2+x-1$ and $g(x)=x^3-x^2+x-1$ in Q[x]

(d) Prove that nth roots of unity are in G.P.

(e)State and explain Rational Roots theorem with example.

(f)Find all solutions of $x^3-i=0$.

10

F.Y.B.Sc (Computer Science)

Aug 2018

P4–Exam.–2018-1–3

Con. 333–18.

Physics - (Paper-I)

(OLD COURSE)

DK–6913

(3 Hours)

[Total Marks : 60

N.B. 1) **All** question are **compulsory**.
2) **Figures** to the **right** indicate **full** marks.
3) Use of **scientific** calculator is **allowed**.

Q. 1) A. Attempt any ONE of the following : 7

1. With diagram explain i) Young's modulus ii) Bulk modulus iii) Modulus of rigidity and iv) Poison's ratio.
2. Explain viscosity and viscous drag in fluids. OBTAIN AN EXPRESSION FOR CONTINUITY.

B. Attempt any ONE of the following : 3

1. For an isotropic homogeneous material prove that $Y = 2\eta\,(1+\sigma)$.
2. A block slides down an incline of angle 30^0 with an acceleration of 0.3g. Find the coefficient of kinetic friction.

Q. 2) A. Attempt any ONE of the following : 7

1. Prove that for the perfect gas $C_p - C_v = R$; where C_p and C_v are molar sp. heats of a gas.
2. State and explain zeroth law of thermodynamics.

B. Attempt any ONE of the following : 3

1. An ideal gas at 2 atm and 27^0C is compressed adiabatically to 1 atm pressure. Calculate the resulting temperature. Given $\gamma = 1.4$
2. When some quantity of an ideal gas at NTP is compressed adiabatically its volume reduces to one fourth of its original calculate final pressure and temperature. ($\gamma = 1.4$)

Q. 3) A. Attempt any ONE of the following : 7

1. Explain the detection of ultrasonic waves using Kundt' s tube.
2. Obtain the general solution of wave equation $\frac{\partial^2 y}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 y}{\partial t^2}$

B. Attempt any ONE of the following : 3

1. An auditorium has a volume of 3000 m^3 It is required to have reverberation time of 1.2 sec. What is the total absorption in a hall ?
2. Calculate the frequency of the fundamental note emitted by piezoelectric crystal. Vibrating length= 3 mm , $Y = 8 \times 10^{10}$ N/m^2 , p = 2.5 gm/cc.

Q. 4) A. Attempt any ONE of the following : 7

1. Obtain an expression for the composition of the two collinear SHMs.
2. Obtain an expression for the linear momentum of a system of particles.

B. Attempt any ONE of the following : 3

1. A conveyor belt is used to move material at the rate of 100 Kg/min. at a constant velocity of 2m/s, calculate the force required and power supplied.
2. Obtain an expression for the composition of two mutually perpendicular SHMs, of two time periods in the ratio 1:2.

(11)

[TURN OVER

Q. 5) A. **Attempt any ONE of the following :** 7

1. Obtain an expression of R.I. of a liquid using Newton's rings.
2. What do you mean by spherical aberration of a lens? Explain one method to minimize it.

B. Attempt any ONE of the following : 3

1. With the help of ray diagram prove that minimum distance between object and image is more than 4 times the focal length.
2. Determine the radii of curvature for a lens of focal length 30 cm and RI 1.5 such that parallel incident rays have minimum spherical aberration.

Q. 6 A. **Attempt any ONE of the following :** 7

1. Explain in brief the working of the following : (i) Step index optical fibre (ii) Graded index optical fibre.
2. With the help of neat diagram explain the construction of He-Ne LASER.

B. **Attempt any ONE of the following :** 3

1. Explain any two properties of LASER.
2. Give an account of application of optical fibre.

Con. 333–18.

(REVISED COURSE)

(3 Hours)

DK–6913

[Total Marks : 48

N.B. 1) **All** question are **compulsory**.
2) **Figures** to the **right** indicate **full** marks.
3) Use of **scientific** calculator is **allowed**.

Q.1) Attempt any TWO of the following : 8

(a) A object slides on a horizontal ice surface. At a certain point in its path its speed is V_0 and the object comes to rest after travelling a distance X_o Show that appropriate coefficient of friction is $\frac{v_o^2}{2gx_o}$.

(b) State and explain Hooke's law.

(c) Derive an equation of continuity.

(d) Calculate Poisson's ratio for Silver Given $Y = 7.25 \times 10^{10}$ N/m^2, $K = 11 \times 10^{10}$ N/m^2.

Q. 2) Attempt any TWO of the following : 10

(a) What are the interactions between a system and its surroundings ? Obtain an expression for mechanical adiabatic work done by the system.

(b) Derive an expression for the work done by the perfect gas in an isothermal expansion.

(c) Explain the following phenomenon in case of LASER (I) Absorption (II) spontaneous emission (III) stimulated emission.

(d) Explain the use of optical fiber in digital communication system.

Q. 3) Attempt any TWO of the following : 10

(a) Explain the acoustic diffraction method for the detection of ultrasonic waves.

(b) What are the factors affecting the architectural acoustics ?

(c) Obtain an equation of wave motion in one dimension.

(d) An auditorium has a volume 5000 m^3. It is required to have reverberation time of 2.5 sec. What should be the total absorption of the hall ?

Q. 4) Attempt any TWO of the following : 10

(a) Obtain an expression for the composition of the two collinear SHMs of same period.

(b) What are Lissajous figures ? Illustrate it with suitable example ?

(c) Obtain an expression for the total K.E. of the system of the partials.

(d) Prove that to accelerate the rocket, initially at rest, to a velocity equal to its ejection velocity u one must arrange to eject all but a fraction 1/e of its original mass.

Q. 5) Attempt any TWO of the following : 10

(a) Obtain an expression for the equivalent focal length and cardinal points for co-axial lens system.

(b) In case of interference by reflected light in thin films show that effective path difference is $D = 2\mu t \cos r \pm \frac{\lambda}{2}$.

(c) Draw neat ray diagram of simple table spectrometer.

(d) Fringes of same thickness are seen in a thin glass wedge of R.I.= 1.65. If the fringe spacing is 2mm and wavelength is 6600 A^0 what is angle of wedge in seconds of arc ?

F.Y. B.Sc (Computer Science)

Aug 2018

Physics - (Paper-II)

WA-JP–Exam.–1st Half –2018–88

Con. 334–18.

(OLD COURSE)

DK-6624

(2 Hours)

[Total Marks : 60

N.B. : (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **scientific** calculator is **allowed**.

1. (a) Attempt any **one** of the following :– 7
   (i) Explain how the growth of current takes in series L-R circuit for a d.c. source.
   (ii) Explain A.C circuit with L-C-R series. Obtain an expression for the phase difference.
   (b) Attempt any **one** of the following :– 3
   (i) Capacitor of 500pF connected in series with a resistance R. If time constant of the circuit is 2.5 ms; What is the value of R ?
   (ii) Find the value of C that resonates with a 300mH inductance at 1500 KHz.

2. (a) Attempt any **one** of the following :– 7
   (i) Draw a diagram of a modern colidge tube. Explain it's construction, working.
   (ii) State and explain the Correspondence principle with suitable example.
   (b) Attempt any **one** of the following :– 3
   (i) Find the radius of the electron in the ground state of Hydrogen atom.
   (ii) The accelerating voltage of an X-ray tube is 60 KV, find the munimum wavelength of X-rays.
   {Data given for both problems : $h = 6{\cdot}63 \times 10^{-34}$ J-S, $m = 9{\cdot}1 \times 10^{-31}$ Kg, $c = 3 \times 10^{8}$ m/s. $\epsilon_0 = 8{\cdot}85 \times 10^{-12}$ S.I., $e = 1{\cdot}6 \times 10^{-19}$ C}.

3. (a) Attempt any **one** of the following :– 7
   (i) What is Half Adder ? How it works ? Write it's truth-table. Draw block and logic diagram.
   (ii) Write a note on transistor as an amplifier.
   (b) Attempt any **one** of the following :– 3
   (i) Draw a neat labeled diagram for transistor characteristics in CE-mode.
   (ii) Draw a circuit diagram of a Zener diode as a voltage regulator.

4. (a) Attempt any **one** of the following :– 7
   (i) State and explain the Maximum Power Transfer theorem.
   (ii) Derive an expression for balancing of a general A.C. bridge with the help of a diagram.
   (b) Attempt any **one** of the following :– 3
   (i) Distinguish between ballistic and dead beat galvanometer.
   (ii) Define : (a) Voltage sensitivity (b) Charge sensitivity.

(14)

[TURN OVER

5. (a) Attempt any **one** of the following :- 7
   (i) State and explain the law of radioactive decay. Derive necessary equation.
   (ii) Write a short note on Nuclear Magnetic Resonance.
   (b) Attempt any **one** of the following :- 3
   (i) Find the disintegration constant of a Radium whose half-life is 1500 Years.
   (ii) 1gm of Radium is reduced by 2.1 mg in 5 years by α-decay. Obtain it's half-life.

6. (a) Attempt any **one** of the following :- 7
   (i) Show that the deBrogli wavelength associated with the electorn can be varied by the accelerating potential.
   (ii) Derive an expression for the change in the wavelength in Compton effect.
   (b) Attempt any **one** of the following :- 3
   (i) What is the frequency of the X-ray photon whose momentum is 1.1 x 10 Kgm, (Use the data given in Q.2 (b)).
   (ii) A non relativistic electron has wavelength 2.0 A, What is it's energy ? (Use the required data of Q.2 (b).)

Con. 334-18. **(REVISED COURSE)** **DK-6624**

(2 Hours) **[Total Marks : 48**

N.B. : (1) **All** questions are **compulsory.**
(2) **Figures** to the **right** indicate **full** marks.
(3) **Use** of scientific calculator is **allowed.**

1. Attempt any **two** of the following :- 8
   (a) In a simple series C-R (D.C.) circuit show that current decays exponentially with time.
   (b) For series LC_r circuit derive expression for the total impedance and phase difference.
   (c) Derive an equation for decay of circuit in case of series L-R circuit connected to source of emf E.
   (d) What is the value of C resonates with a 300 microH inductance of 1500 KHz ?

2. Attempt any **two** of the following :- **10**
   (a) Define half life time. Derive its expression.
   (b) State and explain the correspondence principle.
   (c) Write a note on Nuclear magnetic resonance.
   (d) The radius of electron in ground state of hydrogen atom [h = 6.63 x 10^{-34} J-S, m = 9.1 x 10^{-31} Kg. e = 1.6 x 10^{-19} C, ϵ_0 = 8.85 x 10^{-12} SI units]

(1552)

3. Attempt any **two** of the following :- **10**
   (a) Explain in brief construction and working of half wave rectifier.
   (b) Write a note on transistor as an amplifier.
   (c) How will you use EX-OR gate as Half adder ?
   (d) Draw symbols write truth tables for (i) NAND gate (ii) NOT gate.

4. Attempt any **two** of the following :- **10**
   (a) State and explain maximum power transfer theorem.
   (b) Distinguish between B.G. and dead beat galvanometer.
   (c) Describe De-Sauty's capacitance bridge, obtain balancing condition.
   (d) A balanced Wein bridge with $C_1 = C_2 = 0.01\mu F$, $R_3 = R_4 = 10K$. What is the balancing frequency of the bridge ?

5. Attempt any **two** of the following :- **10**
   (a) Explain the working of modern Coolidge tube to produce X-rays.
   (b) What are pair production and annihilation process ?
   (c) Derive the Mosely's law from Bohr's theory.
   (d) Calculate the energy of neutron having de-Broglie wavelength 10^{-14}m. $[m_0 = 1.6 \times 10^{-27}$ Kg]

F.Y.B.Sc (Computer Science) Aug 2018

P4–Exam.–2018-1-6
Con. 335–18.

Computer Science (Paper - I) DK–6312

(2 Hours) [Total Marks : 48

N.B. (1) All question are **compulsory**.
(2) All question carry **equal** marks.
(3) Draw **diagrams** wherever **necessary**.

Section-I

1. Attempt the following (Any two):- 8
(a) Explain with diagram the basic instruction cycle.
(b) What is Hexadecimal number system? Convert (BC)16 into Decimal & Octal number.
(c) What is computer? Draw & explain block diagram of a computer system.
(d) Perform the following binary subtractions using 1's & 2's complement separately :
(i) (111101-10010)
(ii) (1101101- 10101)

2. Attempt the following (Any two):- 8
(a) Explain full Subtractor.
(b) Explain NAND and NOT with the circuit diagram and truth table.
(c) Draw and explain Basic Logic gates. Write their truth tables.
(d) What is multiplexer? Explain operation of 2:1 mux.

3. Attempt the following (Any two):- 8
(a) What is Cache Memory? Explain its usage.
(b) Discuss the function of CPU.
(c) Explain SRAM and DRAM.
(d) Draw Block diagram of CPU and discuss its functions.

Section-II

4. Attempt the following (Any two):- 8
(a) Write a short note on Direct Mapping.
(b) Write the difference between Random Access Memory and Serially Access Memory.
(c) Write a short note on RAID memory.
(d) What is I/O module? Discuss its memory organization.

5. Attempt the following (Any two):- 8
(a) What is Operating System? Explain its types.
(b) Write a short note on Paging technique.
(c) Explain uni-programming and Multi-programming system. What is batch processing?
(d) Explain characteristics of multiprocessors.

6. Attempt the following (Any two):- 8
(a) Draw a neat block diagram of 8086 microprocessor.
(b) Short note on Multiport memory.
(c) Explain Segment register and Data register of 8086 microprocessors.
(d) Write an 8085 program to add two 8 bit numbers.

---

(17)

[TURN OVER

Con. 335–18. DK–6312

(2 Hours) [Total Marks : 60

N.B. (1) All question are **compulsory**.
(2) All question carry **equal** marks.
(3) Draw **diagrams** wherever **necessary**.

Section-1

1. **Attempt the following (Any two):-** 10
   (a) What is Hexadecimal number system? Convert (BC)16 into Decimal & Octal number.
   (b) What is computer? Draw & explain block diagram of a computer system.
   (c) Perform the following binary subtractions using 1's & 2's complement separately.
      (i) (111101-10010)
      (ii) (1101101-10101)

2. **Attempt the following (Any two):-** 10
   (a) Explain full Subtracter.
   (b) Explain NAND and NOT with the circuit diagram and truth table.
   (c) What is multiplexer ? Explain operation of 2:1 mux.

3. **Attempt the following (Any two):-** 10
   (a) What is Cache Memory ? Explain its usage.
   (b) Explain SRAM and DRAM.
   (c) Draw Block diagram of CPU and discuss its functions.

Section-II

4. **Attempt the following (Any two):-** 10
   (a) Write a short note on Direct Mapping.
   (b) Write the difference between Random Access Memory and Serially Access Memory.
   (c) What is I/O module? Discuss its memory organization.

5. **Attempt the following (Any two):-** 10
   (a) What is Operating System ? Explain its types.
   (b) Write a short note on Paging technique.
   (c) Explain characteristics of multiprocessors.

6. **Attempt the following (Any two):-** 10
   (a) Draw a neat block diagram of 8086 microprocessor.
   (b) Short note on Multiport memory.
   (c) Write an 8085 program to add two 8 bit numbers.

F.Y.B.Sc (Computer Science) Aug 2018

Con. 336–18. Computer Science (Paper-II) DK–6414

(2 Hours) [Total Marks : 48

N.B. : (1) All questions are **compulsory**.
(2) Figures to the **right** indicate **full** marks.
(3) Mixing of **sub-questions** are not **allowed**.

Section I

1. Answer any **two** questions from the following : 8
   (a) Define Algorithm,Explain with simple example.
   (b) Write an algorithm to check number is odd or even.
   (c) How to declare a variable in 'c', what are the rule for naming variable.
   (d) Write C program to display area of circle.

2. Answer any **two** questions from the following : 8
   (a) Explain the following functions.
   printf(), scanf(), getch(), getchar();
   (b) Explain best, worst and avearage case complexity of an algorithm.
   (c) Explain simple 'if' statement, 'if....else' statement, and 'nested if 'statement with syntax and example.
   (d) Write C program to print square and cube of the number.

3. Answer any **two** questions from the following : 8
   (a) Explain 'while' and 'do...while 'loop with syntax and example.
   (b) What is function ? How to declare function and calling of function.
   (c) Explain 'for' loop with syntax and example.
   (d) Write C program to display reverse of the number.

Section II

4. Answer any **two** questions from the following : 8
   (a) What is Array ? How to declare array explain with example.
   (b) Write a note on recursion function.
   (c) Write a note on multidimensional array.
   (d) Write C program to display sum and average of 10 numbers using array.

5. Answer any **two** questions from the following : 8
   (a) Write a note on pointers.
   (b) Explain any four string functions.
   (c) Write a note on structure in C.
   (d) Write C program to compare two strings and display proper output.

6. Answer any **two** questions from the following : 8
   (a) What is stack ? Write an algorithm to add and delete an element from stack.
   (b) Write a note on link list.
   (c) Explain following functions
   fopen(), felose(), fread(), fwrite()
   (d) Write C program to search a character in given string. Print number of occurrences of character.

[TURN OVER

Con. 336–18. DK–6414

(2 Hours) [Total Marks : 60

Section I

1. Answer any **two** questions from the following : **10**
   (a) What are the different types of algorithm ?
   (b) Write an algorithm to display area of circle.
   (c) Write C program to check number is positive or negative.

2. Answer any **two** questions from the following : **10**
   (a) What is function ? How to declare function and calling of function ?
   (b) Explain switch() statement with syntax and example.
   (c) Write C program to print reverse of the number.

3. Answer any **two** questions from the following : **10**
   (a) Explain 'if 'statement with syntax and example.
   (b) Explain 'for' loop with syntax and example.
   (c) Write C program to check number is prime or not.

Section II

4. Answer any **two** questions from the following : **10**
   (a) Write a note on pointers.
   (b) Write a note on recursion function.
   (c) Write C program to display sum and average of 10 numbers using array.

5. Answer any **two** questions from the following. **10**
   (a) What is Array ? How to declare array explain with example.
   (b) Explain following string functions with example.
   1) strcpy() 2) strcat()
   (c) Write C program to compare two strings and display proper output.

6. Answer any **two** questions from the following. **10**
   (a) Write a note on structure in C.
   (b) Write a note on link list.
   (c) Write C program to display array in reverse order.

F.Y.B.Sc (Comp. Sci)