Reg. No. : ....

Name : ....

Second Semester B.Sc. Degree Examination, May 2019

First Degree Programme Under CBCSS

Statistics

Core Course – 2

ST 1241 : STATISTICAL METHODS – II

(2018 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries 1 marks. :

1. Write Spearman's rank correlation formula for repeated ranks.

2. What is the application of scatter diagram?

3. Define coefficient of determination.

4. Write the probable error of correlation coefficient.

5. What is meant by link analysis?

6. List any two visualization techniques used in data mining.

7. Write the function to find the inverse of a matrix using excel.

8. Which is the suitable function in excel to find the quartiles of a data?

9. What is the usage of == operator in R?

10. Write the command to generate observation from Normal distribution using R.

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions. Each question carries **2** marks :

11. Define correlation ratio.

12. Karl Pearson's coefficient of correlation between two variables X and Y is 0.78 and their covariance is 10. If the variance of X is 25, find the standard deviation of Y.

13. Show that if one of the regression coefficient is greater than unity, the other must be less than 1.

14. Distinguish between partial correlation and multiple correlation.

15. Write the normal equation for fitting a parabola.

16. What is decision tree?

17. What is the application of discriminant analysis?

18. Define data warehousing.

19. How to compute the correlation coefficient for two variables in excel?

20. How to draw Bar diagram in excel?

21. What are the logical operators in R?

22. Write down the steps to compute mean, median, variance and standard deviation using R.

(8 × 2 = 16 Marks)

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SECTION – C

Answer any **six** questions. Each question carries **4** marks :

23. Prove that the correlation coefficient lies between –1 and 1.

24. For the regression lines $4x - 5y - 33$ and $20x - 9y = 107$ find :

    (a) mean values of x and y

    (b) the coefficient of correlation between x and y.

25. Fit a curve of the form $y = ax^b$ to the given data

x	1	2	3	4	5
y	87	97	113	129	202

26. Explain the least square method for fitting the curve $y = ab^x$.

27. Describe the applications of data mining.

28. Explain online analytical processing (OLAP).

29. Explain the various data entry methods in R.

30. Write down the important statistical functions available in excel.

31. Explain various control statements in R.

$(6 \times 4 = 24 \text{ Marks})$

SECTION – D

Answer any **two** questions. Each question carries **15** marks :

32. (a) Calculate Pearson's coefficient of correlation from the following data.

X:	10	15	12	17	13	16	24
Y:	30	42	45	46	33	36	40

(b) The ranks of 10 students secured for mathematics and statistics are given. Calculate rank correlation coefficient for the data.

Mathematics	1	2	3	4	5	6	7	8	9	10
Statistics	1	5	3	9	7	2	8	10	4	6

33. Height and Weight of 8 women swimmers are given. Develop a scatter diagram for these data with height as the independent variable. Also fit a linear regression for the data.

Height (in Inches)	68	64	62	65	66	63	65	67
Weight (in Kg)	60	50	47	52	58	50	53	61

34. Explain the role of classification in predictive analysis.

35. Explain :

(a) Neural networks

(b) Logistic regression.

(2 × 15 = 30 Marks)

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Second Semester B.Sc. Degree Examination, May 2019

First Degree Programme under CBCSS

COMPLEMENTARY COURSE

PY 1231.3 – THERMAL PHYSICS AND STATISTICAL MECHANICS

(For Statistics)

(2018 Admission)

Time : 3 Hours

Max. Marks : 80

PART – A

very short answer type.

Answer all questions in one word or maximum of two sentences. Each question carries one mark.

1. State Wiedmann — Franz law.

2. What is an adiabatic process?

3. Explain thermal conductivity.

4. Write down the expression for isothermal elasticity.

5. State Kelvin statement of the Second law of Thermodynamics.

6. Write down the expression for work done by an ideal gas in an isothermal process.

7. Explain Dulong — Petit law.

8. Write down Rayleigh — Jeans law.

9. State Pauli's exclusion principle.

10. Give an example each for a Fermion and a Boson.

$$(10 \times 1 = 10 \text{ Marks})$$

PART – B

Answer **any eight** questions in about one paragraph. Each carry two marks

11. State and explain Carnot's theorem.

12. Show that $C_P - C_V = nR$.

13. Describe the TS diagram for Carnot cycle.

14. Explain the concept of phase space.

15. Describe Fermi energy.

16. State and explain Stefan's law.

17. Discuss the change in entropy during a reversible process.

18. Distinguish between reversible and irreversible processes.

19. Compare average velocity, root mean square velocity and most probable velocity.

20. Describe the Planck radiation formula.

21. Explain the Einstein model of specific heat of a solid.

22. What is the connection between entropy and available energy?

(8 × 2 = 16 Marks)

PART – C

Answer **any six** questions. Each carries four marks.

23. Find the work done by 2 moles of Hydrogen gas when it expands to thrice its initial volume at constant temperature of 300 K.

24. A motor car tyre has a pressure of 2 atmos at room temperature of 27°C. If it suddenly bursts, find its resulting temperature. Take $\gamma = 1.4$.

25. A Carnot engine of source temperature 400 K absorbs 200 joules of heat and rejects 150 calories into the sink. Find the temperature of the sink and the efficiency.

26. Derive the expression for work done by an ideal gas during an adiabatic process.

27. Compare the three distribution laws in statistical mechanics.

28. Explain the Carnot cycle with suitable diagram.

29. Describe how the Rayleigh — Jeans law fails to explain the black body spectrum.

30. Explain the change in entropy when ice is converted into steam.

31. State and explain Wein's displacement law.

(6 × 4 = 24 Marks)

PART – D

Answer **any two** questions. Each carries fifteen marks.

32. Describe the working of a Carnot engine. Derive the expression for its efficiency

33. Explain the Lee's disc experiment to measure thermal conductivity

34. Derive the expressions for molecular energies of an ideal gas

35. Explain the specific heat of electrons in a metal using Fermi – Dirac statistics.

(2 × 15 = 30 Marks)

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Second Semester B.A./B.Sc./B.Com. Degree Examination, May 2019

First Degree Programme Under CBCSS

Language Course IV (ENGLISH II)

(Common for B.A./B.Sc. (EN 1212.1), B.Com. (EN 1211.2) &
Career Related 2 (a) (EN 1211.3))

MODERN ENGLISH GRAMMAR AND USAGE

(2013 Admission Onwards)

Time : 3 Hours   Max. Marks : 80

I.   Answer **all** questions :

1.   Most children below ten play happily with colourful toys. (Identify the predicate)

2.   She likes sweets. (change into negative)

3.   Solomon was the wisest of all men. (add a question tag)

4.   I haven't done ––––––––––– work so far. (use 'some' or 'any')

5.   The Base-ball is a very popular game in America. (correct the sentence)

6.   The train left the platform before I reached. (correct the sentence)

7.   Spain is ––––––––– European country (use 'a' or 'an')

8.   To solve this problem is difficult (begin with 'it')

9. Many a passenger ———————— lost his luggage. (use the correct form ———————— has/have)

10. The former part of the film is more interesting than the ————————
(later/latter)

(10 × 1 = 10 Marks)

II. Answer **any eight** of the following.

11. Convert the following into a complex sentence.

   (a) His absence is due to illness.

   (b) Seeing the policeman, the thief ran away.

12. Change into simple sentence.

   (a) It is a matter that deserves attention.

   (b) Dogs that bark do not always bite.

13. Change into affirmative :

   (a) How terrible it is !

   (b) What a fuss you make !

14. Correct the following sentences :

   (a) He said to me to complete the work.

   (b) The leopard attacked on six villagers.

15. Change the voice :

   (a) They made her apologize.

   (b) They found him guilty.

16. Frame a question to get the underlined word as answer :

    (a) He goes to <u>church</u> everyday.

    (b) I met <u>her</u> in the afternoon.

17. Change into comparative :

    (a) The elephant is the strongest animal on land.

    (b) Kovalam is the most beautiful beach.

18. Add a suitable question tag :

    (a) Honesty is the best policy —————?

    (b) They didnot lose their way, —————?

19. Write the 's' genitive version of the following :

    (a) Visit of the President.

    (b) The house of Mr. John.

20. Rearrange the jumbled words into meaningful sentence :

    (a) was/dancer/painter/the/once/a

    (b) jumped/bus/he/off/the.

21. Replace the underlined words with an adverb.

    (a) She can speak French <u>in a fluent manner</u>.

    (b) He finished the work <u>in a quick fashion</u>.

22. Use the appropriate articles :

    (a) The car is going at fifty miles ————— hour.

    (b) He reads ————— Bible everyday.

(8 × 2 = 16 Marks)

III. Answer any **six** of the following as directed.

23. Complete the following sentences using the correct form of the tenses :

A : Hello Sir, what can I – (do) for you?

B : I ————————— (look) for a good bicycle.

A : There are many new models. Have a ————————— (look).

B : I want one which ————————— (give) a smooth run.

A : Then take this one with a low cost.

B : How much will it cost?

A : Only 2000 Rupees.

B : All right. I ————————— (come) in the evening to purchase it.

A : Thank you sir.

24. Use the correct forms of the words given in brackets.

I was (read) a book when I (hear) a knock on the door. (see) nothing. I (go) on reading the book.

25. Rewrite the following sentences using the correct prepositions :

(a) The meeting started ————————— 5 p.m.

(b) He goes to office ————————— Bus.

(c) He beat me ————————— a stick.

(d) Here comes the bus that you are waiting —————————

(e) India became a Republic ————————— 1950.

(f) Gandhiji was born ————————— 2nd October 1869.

(g) It rained ————————— morning till evening yesterday.

(h) I want your reply ————————— a week.

26. Rewrite the following conversation in indirect speech :

"I am acquainted with your name" , said Kirilov courteously.

"I have seen it in print, even in the soviet union".

"I feel flattered", said Emily.

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27. Correct the following sentences :
    (a) The letter reached us only very lately.
    (b) They were awaiting for our reply.
    (c) He drove very fastly.
    (d) The school principal decided to give him capital punishment.

28. Complete the following sentences using suitable modals :

    (a) You —————————— not enter the class without apologizing to the principal (shall/may/would)

    (b) When I was living with my grandma she —————————— tell stories and fables at bed time. (shall/would/might)

    (c) To become a good driver I —————————— practice every (should/might/could)

    (d) Our team —————————— win, if they tried. (can/could/would)

29. Rewrite the following passage underlining the determinatives, quantifiers and possessives in it :

    (a) Have you got the book?
    (b) The teacher liked her essay.
    (c) This research requires expensive equipment.
    (d) There was no debate and the senate passed all the bills.

30. Fill up using articles :

    (a) —————————— large number of cars were parked outside —————————— school.

    (b) —————————— police arrested —————————— one-eyed man.

    (c) There was —————————— ugly scar on —————————— face of —————————— prisoner.

    (d) We always admire —————————— brave.

31. Rewrite the following providing the correct punctuations :

trains buses autorickshaws cars are not running due to the bandh.

(6 × 4 = 24 Marks)

IV. Answer any **two** of the following :

32. Expand the proverb "united we stand ! Divided we fall !".

(Answer in about two or three pages)

33. Write a short essay on "India : My country".

(Answer in about two to three pages)

34. Write a precis of the following passage :

There is a false idea that a man must live up to his position. It is said that one's house, furniture, and dress should inform the world of one's rank. This idea is foolish. Throw it aside. Find out what you want, and spend money on that; find out what you do not care about, and spend nothing on such things. Find out by practical tests what you really want and enjoy. A man who has not experienced ups and downs, a man who has not been forced to live more cheaply than in former times, has still his education to begin. Let the experiment be made. He will find to his surprise that he has been eating more than was necessary; that the cheap lodging, the rough clothes, the plain food, give him as much pleasure as the costly things that he had previously enjoyed.

The happy man is he who lives wholly in himself. He does what he wishes and not what is thought proper by others. He buys what he wants for himself and not what others expect him to buy. He works at what he believes he can do well and not what will bring him money or favour. However poor he may be, he is always open handed to his friends. If he has more now, he does not care to save, for he knows he can do with less. He shares his sovereign or shilling with a friend. Where do beggars usually go? Not to the great houses where people are rolling in wealth, but to the doors of poor men who have scarcely enough to meet their own needs. (277 words)

35. Arrange the given sentences in the proper order :

(Hints : First sentence and the last sentence are in the correct order. The rest of the sentences have to be rearranged so as to give logical sense to the whole passage).

Generally, we think that 'education' refers to the study of books and what we learn in the class room visiting new places can be an enriching and educative experience. But education is not restricted to that when we hear or read that Banglore is a beautiful place, we can form only a rough picture of the city in a broad sense, education is what we gain by seeing, reading, thinking and acting. However, it is only by visiting the city that we can develop a clear understanding of its culture, language, and history. In this sense, travel is an important part of education. Travel, therefore, adds to our experience and is certainly a part of education.

(2 × 15 = 30 Marks)

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Reg. No. : ....

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Second Semester B.A./B.Sc. Degree Examination, May 2019

First Degree Programme Under CBCSS

English Language

Language Course III

EN 1211.1 : ENVIRONMENTAL STUDIES

(2015 Admission Onwards)

Time : 3 Hours   Max. Marks : 80

I   **Answer all the questions, each in a word or sentence**

1.   What are the four dynamic constituents of environment?

2.   Name the two broad categories of natural resources?

3.   What is the function of the ozone layer?

4.   What is the theme of "The Poplar-Field"?

5.   Define the term ecosystem.

6.   What is chemosynthesis?

7.   Expand WHO.

8.   When was the wildlife protection act passed?

9.   Expand EIA.

10. What is the objective of deep ecology?

(10 × 1 = 10 Marks)

II   Answer any eight questions, each in a short paragraph not exceeding fifty words

11. Explain the term sustainable development.

12. What does Chief Seattle say about rivers?

13. Explain the role of the youth in the conservation of environment.

14. Examine the concept of ecocriticism.

15. Write a note on vermicomposting.

16. Give a brief description about biodiversity hotspots.

17. Explain watershed management.

18. Describe the efforts of United Nations to protect human rights.

19. Write a short note on rainwater harvesting.

20. Explain the various factors that have led to the rapid growth in human population.

21. Elaborate on the concept of anthropocentrism.

22. Describe the bleak nature in Thomas Hardy's "The Darkling Thrush."

(8 × 2 = 16 Marks)

III Answer any six questions, each in a short paragraph not exceeding hundred words

23. Explain the critical environmental issues that affect Kerala.

24. How does Chief Seattle assert that man is an integral part of human nature?

25. Describe the various spheres of earth?

26. Discuss the problem of soil pollution.

'27. Write a note on the environmental significance of Western Ghats.

28. Explain the importance of preserving biodiversity.

29. Write a note on the Environmental Protection Act.

30. Discuss the family welfare programmes initiated by the Government of India.

31. Explain the major water conservation strategies.

(6 × 4 = 24 Marks)

IV **Answer any two questions in three hundred words**

32. Describe the significance and multidisciplinary nature of environmental studies.

33. Analyse Issac Asimov's views on human population and environment.

34. Examine Shashi Tharoor's opinion regarding the ecological consciousness of Indians

35. Discuss the causes and effects of air pollution and the effective strategies that can be adopted to control pollution.

(2 × 15 = 30 Marks)

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Name : ....

Second Semester B.A./B.Sc. Degree Examination, May 2019

First Degree Programme under CBCSS

MALAYALAM LANGUAGE

Language Course V – Additional Language

ML 1211.1 : ഗദ്യസാഹിത്യം

(2018 admission)

Time : 3 Hours

Max. Marks : 80

I.   ഒരു വാക്കിലോ രണ്ടു വാക്യത്തിലോ ഉത്തരം എഴുതുക.

1.   ലക്ഷണമൊത്ത ആദ്യ മലയാള നോവൽ ഏത്?

2.   മാർത്താണ്ഡവർമ്മ എന്ന നോവൽ എഴുതിയതാര്?

3.   വാസനാവികൃതി എന്ന കഥയുടെ കർത്താവ് ആര്?

4.   ഭാരതപര്യടനം എഴുതിയതാര്?

5.   തകഴിയുടെ രണ്ട് നോവലിന്റെ പേരെഴുതുക.

6.   സുന്ദരികളും സുന്ദരന്മാരും എന്ന നോവൽ എഴുതിയതാര്?

7.   ക്ലാസ്സിൽ ഒന്നാംസ്ഥാനം അവൾക്ക് നിർബന്ധമായിരുന്നു. ആർക്ക്?

8.   കാൽപ്പനികതയ്ക്ക് കേസരി ബാലകൃഷ്ണപിള്ള നിർദ്ദേശിച്ച പേര് എന്ത്?

III. **120** വാക്കിൽ കവിയാതെ **ആറ്** ചോദ്യത്തിന് ഉത്തരം എഴുതുക.

23. ഉമ്മാച്ചുവിനെ മായൻ പുനർവിവാഹം ചെയ്യാനുണ്ടായ സാഹചര്യം എന്ത്?

24. ഉമ്മാച്ചുവിന്റെ തറവാട് ഭാഗിക്കാൻ ഇടയായ സാഹചര്യം എഴുതുക.

25. ആദ്യകാല കഥകളുടെ എല്ലാ പ്രത്യേകതകളും ഉൾക്കൊള്ളുന്ന കഥയാണ് ആരാന്റെ കുട്ടി. വിശദമാക്കുക.

26. ദുഃഖത്തിന്റെ തീവ്രത കടൽത്തീരത്ത് എന്ന കഥയിൽ ആവിഷ്കരിക്കുന്നത് എങ്ങനെ?

27. നവോത്ഥാന നോവലുകളെ പറ്റി പ്രതിപാദിക്കുക.

28. മലയാളത്തിലെ കാൽപനികതയെപറ്റി ചുരുക്കി എഴുതുക.

29. ഇ.എം.എസ്. മലയാളഭാഷയെ വിശകലനം ചെയ്യുന്നത് എങ്ങനെ?

30. പാരമ്പര്യത്തെ വെല്ലുവിളിച്ച ചീനമുളകാണ് ചിന്നമ്മു. വിശദമാക്കുക.

31. ഉതുപ്പാന്റെ വിഷമത്തിന് കാരണമെന്ത്?

$(6 \times 4 = 24$ Marks$)$

IV. മൂന്നു പുറത്തിൽ കവിയാതെ **രണ്ടു** ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

32. സ്ത്രീകളോടുള്ള ക്രൂരത അനാവരണം ചെയ്യുന്ന കഥയാണ് കൃഷ്ണഗാഥ. ചർച്ച ചെയ്യുക.

33. മലയാള പ്രതിഭകളുടെ മൗനത്തോടുള്ള താല്പര്യം കെ.പി. അപ്പൻ ആവിഷ്കരിച്ചിരിക്കുന്നത് എങ്ങനെ?

34. ചാപ്പുണ്ണി നായർ എന്ന കഥാപാത്രത്തെ നിരൂപണം ചെയ്യുക.

35. എം.ടി. കഥകളുടെ പൊതുസ്വഭാവം പ്രകടിപ്പിക്കുന്ന ഒരു കഥയാണ് കർക്കിടകം - ചർച്ച ചെയ്യുക.

$(2 \times 15 = 30$ Marks$)$

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Reg. No. : ....

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Second Semester B.Sc. Degree Examination, May 2019

First Degree Programme under CBCSS

Mathematics

Complementary Course

MM 1231.4 MATHEMATICS II – ADVANCED DIFFERENTIAL AND INTEGRAL CALCULUS

(FOR STATISTICS)

(2018 ADMISSION)

Time : 3 Hours

Max. Marks : 80

PART – A

Answer all questions. Each carries 1 mark :

1. Check whether the differential $3\cos x\,dy + \sin y\,dx$ is exact.

2. Give the Taylor series expansion of a function $f(x, y)$ of two variables in x and y about a point (x_1, y_1)

3. Write the sufficient condition for which a point (x, y) to be a stationary point of the function $f(x, y)$.

4. Evaluate $\int_1^2 \int_1^3 x\,y^2 dx\,dy$.

5. Write a Jacobian of the transformation $V = f(x, y)$ $v = g(x, y)$ with respect to x and y.

6. The value of $\int_{-1}^{1} \int_{0}^{2} \int_{0}^{1} xy^2 z \, dx \, dy \, dz$ is .

7. Write the value of the constant $\Gamma(1/2)$.

8. Write the relation between a Beta and Gamma integrals.

9. The value of $B(5, 3)$ is .

10. The value of $\Gamma(5)$ is. $\qquad$ **(10 × 1 = 10 Marks)**

PART – B

Answer **any eight** questions. Each question carries 2 marks.

11. If $f(t) = t^2$ $g(t) = t$, find the rate of $\phi(x, y) = 1 + xy$ with respect to 6.

12. Find the total derivative of $f(x, y) = x^2 + x^4 y$ with respect to x given that $y = x^2$.

13. Check whether $2xyzdx + x^2 zdz + x^2 ydz$ is exact.

14. Find the critical points of the functions $f(x, y) = x^3 y^2(1 - x - y)$.

15. Evaluate $\iint xydxdy$ over the region in the positive equation for which $\dfrac{x}{a} + \dfrac{y}{b} \le 1$.

16. Find the moment of inertia of a uniform rectangular lamina of mass M with sides a and b about one of sides of length a.

17. Evaluate $\iint_R xy \, dy \, dx$ where R is the region bounded by the x-axis, the ordinate $x = za$ and the parabola $x^2 = 4ay$, $a > 0$.

18. Prove that $\beta(m+1, n) + \beta(m, n+1) = \beta(m, n)$.

19. Establish the symmetry rotation between the variables of a beta function.

20. Find the value of $\beta(1, 1/2)$.

21. Prove that $\displaystyle\int_0^1 \frac{dx}{\sqrt{1-x^4}} = \frac{\sqrt{\pi}}{4} \frac{\Gamma(1/4)}{\Gamma(3/4)}$.

22. Prove that $\Gamma\left(n+\dfrac{1}{2}\right) = \dfrac{1.3.5......(2n-1)}{2^n}\sqrt{\pi}$ where n is a positive integer.

(8 × 2 = 16 Marks)

PART – C

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

23. For the functions $f(x, y) = 2x^3y^2 + a$ verify $\dfrac{\partial^2 f}{\partial x \partial y} = \dfrac{\partial^2 f}{\partial y \partial x}$.

24. Find the points on the surface $z^2 = xy + 1$ that are nearest to the origin.

25. A rectangular box open at the top is to have a volume of 32 cubic units. Find the dimensions of the box requiring the least material for this constructions.

26. Find the area of the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$.

27. Evaluate $I = \displaystyle\iiint\limits_R xy\,dx\,dy\,dz$ where R is the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$.

28. If R is the region bounded by the planes $x = 0, b = 0, z = a$ and the cylinder $x^2 + y^2 = 1$, evaluate the integral $\displaystyle\iiint\limits_R xy\,z\,dx\,dy$ by changing it into cylindrical coordinates.

29. Prove that $\Gamma\left(\dfrac{1}{2}\right) = \sqrt{\pi}$.

30. Prove the duplication formula $\Gamma(n)\Gamma\left(n+\dfrac{1}{2}\right) = \dfrac{\sqrt{\pi}}{2^{2n-1}}\Gamma(2n)$.

31. Express the integral $\displaystyle\int_0^1 x^m(1-x^n)^p\,dx$ in terms of the beta functions and hence evaluate $\displaystyle\int_0^1 x^7(1-x^4)^3\,dx$.

(6 × 4 = 24 Marks)

PART – D

Answer **any two** questions. Each question carries 15 marks.

32. If $\quad x = e^u\cos\theta,\ y = e^u\sin\theta\quad$ then $\quad$ show $\quad$ that $\quad$ the $\quad$ relation $\dfrac{\partial^2\phi}{\partial u^2} + \dfrac{\partial^2\phi}{\partial\theta^2} = (x^2+y^2)\left(\dfrac{\partial^2 f}{\partial x^2} + \dfrac{\partial^2 f}{\partial y^2}\right)$ where $f(x,y) = \phi(u,\theta)$.

33. (a) Evaluate $\displaystyle\iint_R (x+y)^2\,dx\,dy$ where R is the region bounded by the circle $x^2 + y^2 = a^2$.

    (b) Evaluate $\displaystyle\int_0^\infty\int_x^\infty \dfrac{e^{-y}}{y}\,dy\,dx$ by changing the order of integration.

34. (a) Using tripple integrals, find the volume of the cube $\{x, u, z); 0 \le xyz \le a^3\}\, a > 0$.

    (b) Find the volume of the half sphere $\{x, y, z)\,|\,0 \le x^2 + y^2 + z^2 \le a^2,\, z > 0\}$.

35. (a) Prove that $B(m, n) = \displaystyle\int_0^1 x^{m-1}(1-x)^{n-1}\,dx$.

    (b) Prove that $\Gamma(n)\,\Gamma\left(n+\dfrac{1}{2}\right) = \dfrac{\sqrt{\pi}}{2^{2n-1}}\Gamma(2n)$.

(2 × 15 = 30 Marks)

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